PART 3

Additional Resources for Biological Assessment Authors

Contents – Part 3

Part 3 Additional Resources for Biological Assessment Authors

Tables

18.0 Gathering Information for a Biological Assessment

18.0 Gathering Information for a Biological Assessment

This chapter provides contact information for the necessary information requests made as one of the first steps in preparing a biological assessment. Examples of information request letters are also included.

The local agency environmental classification summary (ECS) form is also included here, followed by the Endangered Species Act stormwater design checklist. These forms are filled in with project information that the BA preparer needs in order to develop the BA.

18.1 Information Request Contacts and Letter Samples

Information on threatened, endangered, proposed, and candidate species, including species of concern should be acquired from each of the agencies below on a regular basis. To save time, it is highly recommended that listings be requested or, if applicable, acquired online every six months for the entire jurisdiction. Information request letters to resource agencies need to contain a short description of the project(s), the location of the project(s) or jurisdictional limits (county, TRS), the specific request, and a map showing the project or jurisdiction location(s). Information should be requested for a minimum 1.0-mile radius around your project site.

18.1.1 Contacts

18.1.1.1 U.S. Fish and Wildlife Service (USFWS)

Provides legal listing for ESA species under USFWS jurisdiction, available at <http://www.fws.gov/endangered/wildlife.html#Species>.

Western Washington:
Ken Berg
U.S. Fish and Wildlife Service
510 Desmond Drive SE, Suite 102
Lacey, WA 98503-1273
(360) 753-9440

Currently, species listings for western Washington are available on a countywide basis online at <http://www.fws.gov/westwafwo/se/SE_List/endangered_Species.asp>.

Eastern Washington:
Susan Martin
U.S. Fish and Wildlife Service
Spokane Field Office
11103 E. Montgomery Drive
Spokane Valley, WA 99206
(509) 891-6839

Currently, listings for eastern Washington are available on a countywide basis online at <http://www.fws.gov/easternwashington/ESA.html>.

Central Washington:
Mark Miller
U.S. Fish and Wildlife Service
215 Melody Lane, Suite 119
Wenatchee, WA 98801
(509) 665-3508

18.1.1.2 National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries)

Provides legal listing for ESA species under their jurisdiction. (For local agencies, listings also available from WSDOT regional Highways and Local Programs offices.) Currently, salmon listings are available online at <http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Index.cfm>. Use the "Snapshot of ESU Status" link. All other listed species under NOAA's jurisdiction are available online at <http://www.nmfs.noaa.gov/pr/species/>.

Steve Landino
NOAA Fisheries Service
Habitat Program/Olympia Field Office
510 Desmond Dr. SE Ste. 103
Lacey, WA 98503-1273
(360) 753-9440

18.1.1.3 Washington Department of Fish and Wildlife (WDFW)

Provides site-specific information on locations of species monitored by the state that are documented in the Priority Habitats and Species (PHS) database. This is sensitive, confidential information that will need to be requested by letter, and you will need to sign an agreement to obtain it. It cannot be published in any public document, except according to the size and scale specifications contained within the agreement. (This is the best information source on the presence of species near your project.) Within the range of the northern spotted owl and marbled murrelet, data for these species must be specifically requested. There may be a fee associated with this information request. Also, a memorandum of understanding may be established between WDFW and the requesting organization in lieu of a signed agreement for each request.

Lori Guggenmos
Priority Habitats and Species
Washington Department of Fish and Wildlife
600 Capitol Way North
Olympia, WA 98501-1091
(360) 902-2543

18.1.1.4 Washington Department of Natural Resources (WDNR)

Provides information on locations of sensitive plants and rare plant communities that are documented in the Natural Heritage Program (NHP) database. This information will need to be requested by letter.

Sandy Swope Moody
Washington Natural Heritage Program
Department of Natural Resources
P.O. Box 47014
Olympia, WA 98504-7014
(360) 902-1667

18.1.1.5 Washington Department of Fish and Wildlife Regional Habitat Program Managers

For assistance with priority habitats and species information, contact a regional habitat program manager who will direct your questions to a biologist.

Region	Locations of Project (by county)	Contact Person/Email	Address/Phone
Eastern WA Region 1	Pend Oreille, Stevens, Ferry, Lincoln, Spokane, Whitman, Garfield, Walla Walla, Columbia, Asotin	Kevin Robinette Robinkwr@dfw.wa.gov	WDFW, Region 1 8702 North Division Street Spokane, WA 99218-1199 (509) 456-4082
North Central WA Region 2	Okanogan, Douglas, Grant, Adams, Chelan	Tracy Lloyd Lloydtml@dfw.wa.gov	WDFW, Region 2 1550 Alder Street NW Ephrata, WA 98823-9651 (509) 754-4624
South Central WA Region 3	Kittitas, Yakima, Benton, Franklin	Ted Clausing Claustac@dfw.wa.gov	WDFW, Region 3 1701 South 24th Avenue Yakima, WA 98902-5720 (509) 457-9317
North Puget Sound Region 4	San Juan, Island, Whatcom, Skagit, Snohomish, King	Deborah Cornett cornedmc@dfw.wa.gov	WDFW, Region 4 16018 Mill Creek Blvd. Mill Creek, WA 98012-1296 (425) 775-1311
Southwest WA Region 5	Lewis, Wahkiakum, Cowlitz, Skamania, Clark, Klickitat	Steve Manlow manloswm@dfw.wa.gov	WDFW, Region 5 2108 SE Grand Blvd. Vancouver, WA 98661 (360) 906-6700
Coastal Area Region 6	Clallam, Jefferson, Grays Harbor, Mason, Thurston, Pacific, Pierce	Stephen Kalinowski kalinsak@dfw.wa.gov	WDFW, Region 6 48 Devonshire Road Montesano, WA 98563-9618 (360) 249-4628
Special Projects Coordinator	Based out of WDFW Mill Creek office	Rich Costello costerac@dfw.wa.gov	WDFW 16018 Mill Creek Blvd. Mill Creek WA 98012-1296 (425) 775-1311

Letter to the Department of Natural Resources Requesting Information on Sensitive and Rare Plants

May 27, 1998

Ms. Sandy Swope Moody
Washington Natural Heritage Program
Division of Forest Resources
Department of Natural Resources
P.O. Box 47016
Olympia, WA 98504-7016

RE: Haystack Ridge Radio Site

Dear Ms. Moody:

The Washington State Department of Transportation (WSDOT) is planning on building a new radio tower at Haystack Ridge, on a 50 by 400 foot site. The site, which is in Klickitat County, is located in the southwest quarter of the southeast quarter of Section 3, Township 2 North, Range 15 East of the Willamette Meridian.

We are requesting information on the presence of any sensitive plants or rare plant communities in the vicinity of our project. A map showing the approximate location of the project has been included for your use. If you have any questions, please either e-mail me at mcarey@wsdot.wa.gov or call me at 360-705-7404.

Sincerely,

Marion Carey
Wildlife Biologist

MC:js
Enclosure

Letter to WDFW Requesting Priority Habitats and Species Information

(Response will contain federal listing information as well, but this letter cannot substitute a federal request for listing letter)

8 January 1999

Lori Guggenmos
Priority Habitats and Species
WA Dept. Of Fish and Wildlife
P.O. Box 43135
Olympia, WA 98504-3135

RE: City of Jupiter Transportation Projects

Dear Ms. Guggenmos:

The Department of Public Works for the City of Jupiter is planning multiple transportation projects in Milky Way, Washington, over the next year. Our city is located near SR 770 near MP 36.08 to MP 45.30. The legal locations of our jurisdiction are as follows:

T15N, R18W, Sections 11, 10, 3, 4
T16N, R18W, Sections 33, 32, 29, 28, 21, 16, 17, 18, 7, 6
T16N, R17W, Sections 1, 12
T17N, R17W, Sections 36, 25
T17N, R18W, Sections 31, 30

We are requesting updated information on the species that are documented in the PHS database, including spotted owls and marbled murrelets that may be present within the area of the City of Jupiter. A map showing the approximate location has been included. If you have any questions, please feel free to call me at (360) 705-7405 or email me at jorgenk@jupiter.wa.gov.

Sincerely,

Kelley K. Jorgensen
Wildlife Biologist

18.2 Local Agency Environmental Classification Summary Form

The local agency environmental classification summary (ECS) form is now available online (in PDF or FileMaker Pro format) from the WSDOT Highways and Local Programs website: <http://www.wsdot.wa.gov/TA/Operations/Environmental/EnviroUpdates.html>. This form is also included in PDF format on the compact disc accompanying this manual.

18.3 Endangered Species Act Stormwater Design Checklist

The Stormwater Design Checklist assists project designers in providing pertinent information about a project's stormwater treatment facilities to biologists responsible for preparing biological assessments required for consultation under Section 7 of the Endangered Species Act. The use of this checklist is necessary to aid in developing biological assessments, and to promote consistency in the content provided in the agency's biological assessments.

It is possible that the specific conditions of some projects may warrant modifying or adding certain checklist items. However, to maintain consistency in the type and amount of information collected and submitted for the environmental permitting process, the checklist should be modified only if necessary.

18.3.1 Runoff Treatment

In another noteworthy revision, this checklist no longer refers to treating 140 percent of new impervious surface area for basic water quality treatment. The 140 percent approach was associated with conventional runoff treatment BMPs employing filtration or settlement of pollutants as the removal mechanism (e.g., biofiltration swales, filter strips, and basic wet ponds). Since the development of the 140 percent threshold in 1999, stormwater management in Washington state has changed considerably. The Ecology stormwater management manuals for western and eastern Washington now require that arterial and highway runoff be given "enhanced" treatment. *Enhanced treatment*, as defined in the Ecology manuals, is a treatment system optimized to improve the capture of dissolved metals through processes involving sorption, ion exchange, biofiltration, or precipitation.

The 2005 WSDOT *Highway Runoff Manual* contains several designs that achieve both basic and enhanced treatment within a single stormwater facility. Examples include designs for the ecology embankment, dispersion, compost-amended filter strip, and enhanced biofiltration swale, among others.

The former 140 percent threshold was developed as the level of runoff treatment necessary to result in a biological assessment determination of *no effect* on protected species, given basic treatment's pollutant-removal effectiveness of less than 100 percent. With the availability of

enhanced treatment and more specific guidance in the *Highway Runoff Manual* for retrofitting existing impervious surfaces, treating 140 percent of the new impervious surface is no longer necessary to achieve a determination of *no effect*.

18.3.2 Flow Control

For flow control, the method used in Instructional Letter 4020.02 required the use of a volume correction factor to increase the volume of detention ponds designed using an event-based model, the Santa Barbara Urban Hydrograph (SBUH) method. For stormwater detention designs in western Washington, the SBUH method has since been replaced with U.S. Environmental Protection Agency's Hydrologic Simulation Program – Fortran-based (HSPF-based) continuous runoff models, such as MGSFlood, the King County Runoff Time Series, or the Western Washington Hydrologic Model. These continuous runoff models enable detention ponds and discharge orifices to be sized with post-project flow/duration curves matching some desired predevelopment condition. The result is significantly larger detention ponds than those previously constructed under Instructional Letter 4020.02.

18.4 Endangered Species Act Stormwater Design Checklist

Project Name: _____

Project Location: _____

General Project Information

1. Will work occur outside existing pavement or gravel shoulders? ☐ Yes ☐ No

   If *yes*, describe the nature and extent of the work:
   _____
   _____
   _____
   _____

Existing Impervious Surface and Stormwater Facilities (Preproject)

2. Is there any existing impervious surface within the project area? ☐ Yes ☐ No

   If *yes*, for each threshold discharge area (TDA), identify the amount of existing impervious surface within the project limits:
   _____ (square feet, acres)

   If *no*, go to #11.

3. For each TDA, identify the total area of existing impervious surface currently receiving runoff treatment:
   _____ (square feet, acres)

4. Will any existing impervious surface receive runoff treatment (i.e., retrofit)? ☐ Yes ☐ No

   If *yes*, for each TDA, identify how much of the existing impervious surface will be retrofitted for runoff treatment _____ (square feet, acres), and the level(s) of treatment:

   ☐ *Basic* ☐ *Enhanced* ☐ *Oil Control* ☐ *Phosphorous Control*

5. For each TDA, identify the total area of existing impervious surface currently receiving flow control:
   _____ (square feet, acres)

6. Will any existing impervious surface receive flow control (i.e., retrofit)? ☐ Yes ☐ No

   If *yes*, how much of the existing impervious surface in each TDA will be retrofitted for flow control? _____ (square feet, acres)

7. Is any of the runoff from the existing impervious surface infiltrated? ☐ Yes ☐ No

   If *yes*, what percentage of the runoff from the existing impervious surface in each TDA is infiltrated? _____%.

   How much of the runoff volume does this represent? _____ (acre-feet)

8. Identify the type(s), location(s), footprint(s), and receiving area/water body for each runoff treatment and flow control BMP. If available, provide a map depicting TDA boundaries and BMP locations.

   _____
   _____
   _____
   _____
   _____

9. Describe the nature of the stormwater conveyance (drainage) system (e.g., pipe, culvert, channel, ditch, swale, sheet flow). If available, provide a map of the system depicting TDA boundaries.

   _____
   _____
   _____
   _____
   _____

10. Is off-site stormwater being treated/controlled by WSDOT stormwater facilities prior to initiation of the project? ☐ Yes ☐ No

    If *yes*, will this stormwater continue to be treated/controlled to the same level? ☐ Yes ☐ No

    If off-site stormwater will not continue to be treated/controlled to the same level, explain why not:

    _____
    _____
    _____
    _____
    _____

New Impervious Surface and Stormwater Facilities (Proposed Project)

11. Will the project create a net gain in impervious surface? ☐ Yes ☐ No

    If *yes*, for each TDA, identify how much net-new impervious surface the project will create:
    _____ (square feet, acres)

    If *no*, will the project result in a net decrease in impervious surface? ☐ Yes ☐ No

    If *yes*, for each TDA, identify how much net loss will result:
    _____ (square feet, acres)

12. Will the project require runoff treatment? ☐ Yes ☐ No

    If *yes*, for each TDA, identify the total area of new impervious surface treated:
    _____ (square feet, acres) and identify the level(s) of treatment required:

    ☐ *Basic* ☐ *Enhanced* ☐ *Oil Control* ☐ *Phosphorous Control*

13. Will the project require flow control? ☐ Yes ☐ No

    If *yes*, for each TDA, identify the total area of new impervious surface to receive flow control:
    _____ (square feet, acres)

14. Will any of the runoff from the new impervious surface be infiltrated? ☐ Yes ☐ No

    If *yes*, what percentage of the runoff from the new impervious surface in each TDA will be infiltrated?
    _____%

    How much of the runoff volume does this represent? _____ (acre-feet)

15. Are any of the project's TDAs exempt from the flow control requirement? ☐ Yes ☐ No

    If *yes*, identify the exempt TDA(s):
    _____
    _____
    _____
    _____
    _____

    If *no*, and the project is petitioning for an exemption, has a hydrologic analysis supporting the exemption been approved by Ecology? ☐ Yes ☐ No

If *yes*, provide a summary of the analysis as an attachment to this checklist.

If *no*, a hydrologic analysis justifying the exemption must be submitted to Ecology for approval, or flow control must be provided.

16. If applicable, identify the type(s), location(s), and footprint(s) for each runoff treatment and flow control BMP. If available, provide a map of depicting TDA boundaries and BMP locations.

17. Describe the nature of the stormwater conveyance (drainage) system (e.g., pipe, culvert, channel, ditch, swale, sheet flow). If available, provide a map of the system depicting TDA boundaries.

18. Will the project require construction of a new stormwater outfall structure or a new point of discharge to any water body? ☐ Yes ☐ No

    If *yes*, identify the receiving water body, and describe areas of permanent and temporary clearing or grading, types of vegetation to be removed, amount of riprap, diameter of outfall pipe(s), and all maintenance/access roads to be constructed. If available, provide a map of outfall locations.

19. If the project is not infiltrating all of the runoff from the new impervious surface and is unable to provide the required runoff treatment or flow control for the entire new impervious surface, explain why not. (Documentation should include a completed copy of the *Engineering and Economic Feasibility (EEF) Evaluation Checklist*.)

20. What stormwater management design standards were applied?

- ☐ WSDOT *Highway Runoff Manual*, version _____ (1995, 2004, 2006, etc.)
- ☐ Ecology's *Stormwater Management Manual*(s), version _____ (2001, 2005 Western Washington; 2003, 2004 Eastern Washington, etc.)
- ☐ Other: _____
- ☐ Not Applicable

Prepared by_____ Phone_____ Date_____

Project Engineer_____ Office Location_____

19.0 Submitting a No-Effect Letter or Biological Assessment

19.0 Submitting a No-Effect Letter or Biological Assessment

Section 7 consultation is initiated with the Services (NOAA Fisheries or USFWS) by submittal of a biological assessment with a cover letter requesting consultation. Consultation is initiated by the appropriate WSDOT Regional Biologist not the project biologist. Project biologists are responsible for completing the biological assessment analysis and providing this documentation along with required effect determinations to the project manager or regional biologist, depending on which individual has served as the primary point of contact throughout the development of the biological assessment. The project manager will coordinate with the regional biologist to ensure the documents are submitted, along with a formal cover letter, to the Services for consultation.

A *no-effect* letter, indicating that a project will not result in an adverse effect on listed species or designated critical habitat, documents the *no-effect* determination for the federal action agency and does not require concurrence by the Services, but it must be documented with the appropriate agency.

Determining which agencies require the particular forms of documentation can be confusing and depends on the current policies of the USFWS, NOAA Fisheries, and the federal action agencies involved. This chapter provides guidance to WSDOT Regional Biologists for identifying the agencies that require documentation regarding *no-effect* determinations or initiating Section 7 consultation with the Services.

This chapter, in particular the templates and checklists for no effect letters and biological assessments, has been included in this manual as a reference for project biologists to aid in the preparation of biological assessments.

19.1 Submitting a No-Effect Letter

No-effect letter recipients, copy recipients, required attachments, and contacts for coordinating consultation for WSDOT projects are listed in Tables 19-1 and 19-2.

All no-effect letters are sent to the federal action agency (FHWA or the Corps of Engineers) for its files. Because no effect letters are sent to the action agency only, biologists may choose to address species under the jurisdictions of USFWS and NOAA Fisheries in a single letter rather than in two separate letters.

Copies of the no-effect letter and enclosures should be sent to the WSDOT regional biologist or biology program manager and the regional environmental manager. USWFS and NOAA have requested that they not be sent copies of no-effect letters.

Table 19-1. Document routing for no-effect letters and biological assessments.

Document Type	Sender	Recipient	Copy Recipients:
For species under the jurisdiction of NOAA Fisheries			
No-effect letter	Nonfederal designee [a]	FHWA or Corps of Engineers	WSDOT region [b] FHWA or Corps of Engineers Corps of Engineers (for FHWA projects requiring a Corps permit)
Informal initiation package	Nonfederal designee [a]	NOAA Fisheries	WSDOT region [b] FHWA or Corps of Engineers Corps of Engineers (for FHWA projects requiring a Corps permit)
Formal initiation package	Federal action agency (FHWA or Corps of Engineers) [b]	NOAA Fisheries	WSDOT region [b] Corps of Engineers (for FHWA projects requiring a Corps permit)
For species under the jurisdiction of USFWS			
No-effect letter	Nonfederal designee [a]	FHWA or Corps of Engineers	WSDOT region [b] FHWA or Corps of Engineers Corps of Engineers (for FHWA projects requiring a Corps permit)
Informal initiation package	Nonfederal designee [a]	USFWS	WSDOT region [b] FHWA or Corps of Engineers Corps of Engineers (for FHWA projects requiring a Corps permit)
Formal initiation package	Federal action agency (FHWA or Corps of Engineers) [c]	USFWS	WSDOT region [b] Corps of Engineers (for FHWA projects requiring a Corps permit)

[a] The nonfederal designee status is issued to a state or local agency in a letter by a federal action agency. FHWA has designated WSDOT as its nonfederal designee. The Corps of Engineers has several nonfederal designees, including WSDOT.
[b] WSDOT region: Include the regional biologist or biology program manager and the regional environmental manager.
[c] WSDOT sends the project information and effect determinations in the form of a draft cover letter by electronic mail to the federal action agency. The BA is sent only in hard copy form to the federal action agency.

Table 19-2. WSDOT contact list for no-effect letters and biological assessments.

Agency	Address
USFWS Eastern Washington	Current manager Spokane field office U.S. Fish and Wildlife Service 11103 E. Montgomery Drive Spokane, WA 99206
USFWS Western Washington	Current manager Western Washington Fish and Wildlife Office U.S. Fish and Wildlife Service 510 Desmond Dr. SE, Suite 102 Lacey, WA 98503-1273
NOAA Fisheries	Current director NOAA Fisheries Habitat Program/Olympia field office 510 Desmond Dr. SE, Suite 103 Lacey, WA 98503-1273
FHWA	Area engineer FHWA <http://www.fhwa.dot.gov/wadiv/progdel.htm>
Corps of Engineers	Corps liaison <http://www.wsdot.wa.gov/environment/ES_StaffList.htm#Liaison>

WSDOT	Regional biologist or biology program manager or Environmental manager <http://wsdot.wa.gov/Contact/contacts.htm>

If a project is conducted by FHWA and requires a permit from the U.S. Army Corps of Engineers, the Corps also receives a copy of the no-effect letter and enclosures.

No-effect letters should be submitted with vicinity and site maps, site photographs, and a species list. Examples of no-effect letters are provided in Section 20.1.2.

19.1.1 No-Effect Letter Template

Action Agency Address

ATTN:

Re: *Project Name*

Dear :

Local Agency Name is proposing to *project description*. We have prepared this assessment on behalf of FHWA (or the U.S. Army Corps of Engineers) in response to a listing we received on *date*. The listing indicated the potential presence of *listed species.*

The project is located *provide location including street, county, township, range, and section*. Proposed work includes *detailed project description*. Construction is planned for *(months and year*) and will take approximately *(amount of time in days)* to complete. *Describe expected noise and disturbance issues from project.*

A field review of the project site was conducted on *date*, by a *agency* biologist. Land use in the vicinity of the project area consists of (*describe land use in terms of available habitat for any listed or proposed species, existing noise disturbance, etc.*).

Describe habitat present as it relates to each threatened or endangered species. Address known and potential presence of threatened or endangered species in habitat.

Review of the Washington State Department of Fish and Wildlife Priority Habitats and Species Database (*include all data bases reviewed or other sources such as local fisheries biologists*) indicated that *provide site-specific information etc.*

Discuss potential impacts of construction for each listed species or guild of species (e.g., fish). Describe fully the justification, including how the potential impacts will be avoided in order to reach a no-effect determination. Use one paragraph for each species, and include the no-effect determination.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) includes a mandate that NOAA Fisheries must identify essential fish habitat (EFH) for federally managed marine fish, and federal agencies must consult with NOAA Fisheries on all activities, or proposed activities, authorized, funded, or undertaken by the agency that may adversely affect EFH. The Pacific Fishery Management Council (PFMC) has designated EFH for the Pacific salmon fishery, federally managed ground fishes, and coastal pelagic fisheries (NOAA Fisheries 1999; PFMC 1999).

Identify the designated EFH that occurs in the vicinity of the proposed project–it may be more than one. Briefly describe the habitat characteristics and species included within the designated EFH.

We have determined that (*select appropriate reasons*) due to the location, the type of work proposed, time of year work is proposed to occur, lack of use of the project area, likelihood of very low level of use, large amount of available habitat in immediate vicinity of the project, etc.). *Make an effect determination for each listed species. Make a jeopardy call and a conditional (upon listing) effect determination for proposed species. Make an impact assessment for candidate species and species of concern.* We have determined that, (*select appropriate reasons*) due to the location, the type of work proposed, the large amount of available habitat in the immediate vicinity of the project, etc.). *Make an effect determination for each designated EFH, as appropriate.*

This assessment satisfies the *title of action agency's* **responsibilities under Section 7(c) of the Endangered Species Act at this time. We are sending you this copy of our assessment for your files. We will continue to remain aware of any change in status of these species and will be prepared to reevaluate potential project impacts if necessary**.

Please call (*biologist*) if you require additional information or have any questions about this project.

Sincerely,

Attachments: Vicinity map and photos

cc: FHWA
Corps of Engineers
WSDOT Region

KEY:

regular - recommended wording
Italics - fill in with appropriate information
Bold - key wording that should be left in

19.1.2 Examples of No-Effect Letters

19.1.2.1 No-Effect Letter Submitted to the Federal Highway Administration for Species Under the Jurisdiction of the U.S. Fish and Wildlife Service

Date

Name of area engineer
Federal Highway Administration
Region
Address

Subject: No-effect letter; SR 302, Elgin – Clifton Road Intersection, MP 10.51 to 10.63
WSDOT Project No._____
Federal aid No._____

Dear *name of area engineer*:

Describe project: The Washington State Department of Transportation (WSDOT) is proposing to improve safety at a high accident location by installing a traffic signal with possible illumination, repairing a failing shoulder, upgrading associated signs, repaving, and restriping the intersection of State Route (SR) 302 at the Elgin–Clifton road intersection. The intersection is a high traffic area where existing stop signs are not adequate for the present level of traffic volume.

We have prepared this assessment on behalf of the Federal Highway Administration (FHWA) to address federally listed threatened or endangered species under the jurisdiction of the U.S. Fish and Wildlife Service (USFWS).

Give names of listed species present: The current USFWS listing of species under its jurisdiction indicates the potential presence in the project area of threatened bald eagle, bull trout, marbled murrelet, northern spotted owl, gray wolf, grizzly bear, marsh sandwort, golden paintbrush and water howellia. Critical habitat for northern spotted owl and marbled murrelet has been designated in the county, and critical habitat has been proposed for bull trout.

The possible presence of listed species in the project area was further evaluated by reviewing Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species (PHS) data, WDFW Wildlife Heritage data set, WDFW Stock Inventory data, and the Washington Department of Natural Resources (WDNR) Natural Heritage Program rare plant data.

Describe project location: The proposed project is located on the Kitsap Peninsula, in Pierce County, Washington on SR 302 from milepost (MP) 10.51 to MP 10.63 (Township 22 North, Range 1 East, Sections 20 and 29). The project area will be within the developed road prism of SR 302 at the Elgin–Clifton intersection with the Gig Harbor-Longbranch Highway. The action

area for the project will be 0.25-miles around the project due to the increased noise and visual disturbance during construction.

Describe project activities: Proposed work includes installation of a traffic light and signal box, and trenching of conduit. All work will occur in the existing road right of way. The signal box will most likely be located in the traffic island due to ease of access for future maintenance. Any vegetation to be removed for signal box installation, signal placement, and conduit trenching will consist of nonnative blackberries, Scot's broom, and roadside grasses. The concrete for the new signal will cure for approximately 30 days. New impervious surface will be minimal (approximately 32 square feet) for the signal box. Pavement will then be overlaid, restriped, and signage upgraded. The pavement overlay will include grinding at the abutment to existing pavement before the pavement overlay.

To repair a failing shoulder, an existing cross-culvert will be cut and extended approximately 10 feet. This will involve removal of minor amounts of salal and roadside grasses. Approximately 10 cubic yards of fill will be added to the shoulder to repair the roadbed, and bring the shoulder to standard, before the pavement overlay. All work will take place from the existing roadway, and the final shoulder will match the original road prism. Traffic may be detoured approximately 0.5 miles around the intersection from SR 302 to 134th Road (a road that receives heavy traffic under normal conditions) during the second phase for up to two nights.

Describe construction schedule: Construction is scheduled to begin in June 2005 and will be completed by September 2005. Actual workdays for the project will be approximately two days for the first phase of the project, and approximately two days for second phase of the project.

Describe land use in the vicinity: Land use in the vicinity of the project area is low-density rural residential, managed timberland, and some commercial buildings along the detour route. Noise levels are relatively high due to the high traffic volumes associated with the intersection.

Describe habitat present as it relates to threatened and endangered species: Overstory vegetation near the roadway is comprised primarily of second growth Douglas fir with some red and madrone. Understory vegetation near the roadway consists of nonnative Scot's broom, Himalayan blackberry, and roadside grasses. Swordfern, evergreen huckleberry, and salal also occur in the project area. A traffic island, located at the intersection of the project, contains roadside grasses and Scot's broom. Residential ornamental vegetation and lawns are located off the roadway corridor in the action area.

Describe availability of suitable habitat: WSDOT biologists visited the project area on date to determine the status and availability of suitable habitat for listed species in the project area and to evaluate any potential impacts of the proposed project. Water howellia and marsh sandwort occur in wetland habitats. Potential suitable habitat may exist for water howellia and marsh sandwort in wetland areas present outside the project work area in the action area. The project will not disturb or alter wetland areas, hydrology will not be altered, and only minimal new impervious surface will be created. Therefore, the project will have no effect on water howellia or marsh sandwort.

There are no documented bald eagle nests, nesting territories, wintering areas, or communal roosts within one mile of project activity. There are no waterfowl or fish foraging opportunities for bald eagle in the project action area. The project will be completed outside the bald eagle wintering season (October 31 – March 31), and no suitable habitat for bald eagles will be affected. Therefore, the project will have *no effect* on bald eagles.

There are no streams within 0.25 miles of the project. Therefore, no suitable habitat exists for bull trout in the action area. There are no mature forests within 0.25 miles of the project that contain habitat elements suitable for either northern spotted owl or marbled murrelet. The action area does not contain any prairie habitat that would be suitable for golden paintbrush. Gray wolf and grizzly bear suitable habitat may occur in the eastern Pierce County, but not on the Kitsap Peninsula in western Pierce County. Therefore, the project will have *no effect* on bull trout, northern spotted owl, marbled murrelet, golden paintbrush, gray wolf, or grizzly bear.

The project action area does not contain designated critical habitat for northern spotted owl and marbled murrelet or proposed critical habitat for bull trout. Therefore, the project will have *no effect* on critical habitat for northern spotted owl, marbled murrelet, or proposed critical habitat for bull trout.

This assessment satisfies the *title of action agency's* responsibilities under Section 7(c) of the Endangered Species Act at this time. We are sending you this copy of our assessment for your files. We will continue to remain aware of any change in status of these species and will be prepared to reevaluate potential project impacts if necessary.

Please call *name of project biologist* (WSDOT, *telephone number*) if you require additional information or if you have any questions about this project.

Sincerely,

Name of biology program manager
Title of biology program manager

Enclosures: *Vicinity and site maps, photos, and USFWS species listing*

cc w/enclosures: *Name of regional environmental manager,* WSDOT *region*
Name of regional biology branch manager, WSDOT *region*
Corps liaison (if this is a FHWA project requiring a Corps permit)

19.1.2.2 Example 2: No-Effect Letter Submitted to the Federal Highway Administration for Species Under the Jurisdiction of NOAA Fisheries

Date

Name of area engineer
Federal Highway Administration
Region
Address

Subject: No-effect letter; SR 302, Elgin – Clifton Road Intersection, MP 10.51 to 10.63
WSDOT project No. _____
Federal aid No. _____

Dear *name of area engineer:*

Describe project: The Washington State Department of Transportation (WSDOT) is proposing to improve safety at a high accident location by installing a traffic signal with possible illumination, repairing a failing shoulder, upgrading associated signs, repaving, and restriping the intersection of State Route (SR) 302 at the Elgin–Clifton road intersection. The intersection is a high traffic area where existing stop signs are not adequate for present traffic volumes. We have prepared this assessment on behalf of the Federal Highway Administration (FHWA) to address federally listed species under the jurisdiction of the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries).

Describe listed species present: NOAA Fisheries provides listings of threatened and endangered species under its jurisdiction. The current listing indicates the potential presence of the Puget Sound evolutionarily significant unit (ESU) of chinook salmon in the project area. In addition, designation of critical habitat for Puget Sound ESU chinook salmon has been proposed in the project action area.

Describe project location: The proposed project is located on the Kitsap Peninsula in Pierce County, Washington, on SR 302 from milepost (MP) 10.51 to MP 10.63 (Township 22 North, Range 1 East, Sections 20 and 29). The project area will be within the developed road prism of SR 302 at the Elgin–Clifton intersection with the Gig Harbor-Longbranch Highway. The action area for the project will be 0.25-miles around the project footprint due to the potential for increased noise and visual disturbance during construction.

Describe project activities: Proposed work includes installation of a traffic light and signal box, and trenching of conduit. All work will occur within the existing road right-of-way. The signal box will most likely be located in the traffic island due to ease of access for future maintenance. Any vegetation to be removed for signal box installation, signal placement, and conduit

trenching will consist of nonnative blackberries, Scot's broom, and roadside grasses. The concrete for the new signal will cure for approximately 30 days. New impervious surface will be minimal (approximately 32 square feet) for the signal box. Pavement will then be overlaid and restriped, and signage will be upgraded. The pavement overlay will include grinding at the abutment to existing pavement before the pavement overlay.

To repair a failing road shoulder, an existing cross-culvert will be cut and extended approximately 10 feet. This will involve removal of minor amounts of salal and roadside grasses. Approximately 10 cubic yards of fill will be added to the shoulder to repair the roadbed, and bring the shoulder to standard, before the pavement overlay. All work will take place from the existing roadway, and the final shoulder will match the original road prism. Traffic may be detoured approximately 0.5 miles around the intersection from SR 302 to 134th Road during the second phase for up to two nights.

Describe construction schedule: Construction is scheduled to begin in June 2005 and will be completed by September 2005. Actual workdays for the project will be approximately two days for the first phase of the project, and approximately two days for second phase of the project.

Describe land use in the vicinity: Land use in the vicinity of the project area is low-density rural residential, managed timberland, and some commercial buildings along the detour route. Noise levels are relatively high due to the high traffic volumes associated with the intersection.

Describe habitat present as it relates to threatened and endangered species: WSDOT biologists visited the project area on *date* to determine the status and availability of suitable habitat for listed species in the project area and to evaluate any potential impacts of the proposed project. The project does not involve any work in or near aquatic habitats and creates minimal new nonpolluting impervious surface.

Therefore, the project will have *no effect* on Puget Sound ESU chinook salmon. The project *will not destroy or adversely modify* proposed critical habitat for Puget Sound ESU chinook salmon. If proposed critical habitat is designated for Puget Sound ESU chinook salmon prior to completion of the project, the project will have *no effect* on Puget Sound ESU chinook critical habitat.

This assessment satisfies the *title of action agency's* responsibilities under Section 7(c) of the Endangered Species Act at this time. We are sending you this copy of our assessment for your files. We will continue to remain aware of any change in status of these species and will be prepared to reevaluate potential project impacts if necessary.

In compliance with the Magnuson-Stevens Fishery Conservation and Management Act, essential fish habitat (EFH) was assessed for the project. It was determined that the project will not have an adverse effect on EFH.

Please call *name of project biologist* (WSDOT, *telephone number*) if you require additional information or if you have any questions about this project.

Sincerely,

Name of biology program manager
Title of biology program manager

Enclosures: *Vicinity and site maps, photos, and NOAA species listing*

cc w/enclosures: *Name of regional environmental manager,* WSDOT *region*
Name of regional biology branch manager, WSDOT *region*
Corps liaison (if this is a FHWA project requiring a Corps permit)

19.1.3 No-Effect Letter Checklist

No-Effect Letter Checklist

Project name: _____
Region, city or county: _____
Biologist name, affiliation, and phone number: _____
Contact name, agency/region, phone number: _____

General comments:

_____
_____
_____
_____
_____
_____

Typically, the no-effect letter (NEL) should be two to three pages in length, depending on the complexity of the proposed action. The purpose of the NEL is to document and support the no-effect determination(s). The focus of a NEL should be a brief but complete project description, species habitat and occurrence information, analysis of project impacts, and justification for the no-effect determination. The NEL should end with this language: "*It is our understanding that this satisfies our responsibilities under Section 7 (c) of the Endangered Species Act at this time, and we are sending you this copy of our assessment for your files. We will continue to remain aware of any change in status of these species and will be prepared to re-evaluate potential project impacts if necessary*."

Key:
SUF = Sufficient information contained in the NEL;
INC = Incomplete or insufficient information to justify *no-effect* determination;
MIS = Missing information that is key to addressing potential impacts and justifying the no-effect determination;
N/A = Not applicable, the project does not require this information to justify the no-effect determination, or does not apply.
Remember, the level of detail should be commensurate with the effects of the action.

No-Effect Letters Should Include the Following Information:

SUF	INC	MIS	N/A	
☐	☐	☐	☐	A. Describe the overall **purpose of the project** and a brief summary of project objectives. Estimate the duration and the dates that the project will occur.
☐	☐	☐	☐	B. Provide a legal description (Section, Township, Range) and vicinity map that clearly shows the project in relation to nearby waterbodies, sensitive habitats, etc.

SUF ☐ INC ☐ MIS ☐ N/A ☐

C. Photographs, especially color copies, are useful to orient the reviewer to the project area. A combination of aerial or orthophotos, and snapshots are ideal.

SUF ☐ INC ☐ MIS ☐ N/A ☐

D. List all proposed project related construction activities and types of equipment. Describe expected noise and disturbance issues. Estimate timing (daylight/nighttime) of project activities. Include all phases or stages of the project. Include any secondary project features such as mitigation, staging areas, detours, waste and stockpile sites, etc.

SUF ☐ INC ☐ MIS ☐ N/A ☐

E. Describe the project setting in terms of physiographic region, general topography, dominant habitat and vegetation type(s), aquatic resources, land use patterns and existing disturbance levels from human activities, roadways, etc.

SUF ☐ INC ☐ MIS ☐ N/A ☐

F. Quantify area of habitat disturbance and project-related impacts. Examples include: vegetation removal (include species and size [height and dbh]), stream substrate disturbance, proposed earthwork, increase in impervious surface, etc.

SUF ☐ INC ☐ MIS ☐ N/A ☐

G. Based on geographic area that will be affected by project impacts, define the project action area.

SUF ☐ INC ☐ MIS ☐ N/A ☐

H. Identify species addressed in no effect letter. Cite species listings provided by NMFS and/or USFWS. Append a copy of the listing to the report. Species listings should be updated every 6 months (listings must not be more than 6 months old) or if there are status changes.

SUF ☐ INC ☐ MIS ☐ N/A ☐

I. Describe the potential suitable habitat for the species found onsite or in the project vicinity. Reference WDFW PHS data, state salmonid stock inventories, and consult WDFW/tribal habitat biologists for species use in the project vicinity.

SUF ☐ INC ☐ MIS ☐ N/A ☐

J. Date of field review(s) of project, personnel involved, and results of visit(s).

SUF ☐ INC ☐ MIS ☐ N/A ☐

K. Analyze project impacts as they relate to the species and/or critical habitat being addressed. Determine potential for exposure to specific impacts. If exposure will not occur, this is a no effect.

SUF ☐ INC ☐ MIS ☐ N/A ☐

L. Document why likely impacts to the listed species and their habitat from construction and/or operation of the project will not occur (one paragraph per species).

SUF ☐ INC ☐ MIS ☐ N/A ☐

M. A no-effect determination must be made for each listed species as well as designated critical habitat (if appropriate). It must provide supporting evidence to justify the no-effect determination. A no-jeopardy call and a conditional (upon listing) no-effect determination should be made for proposed species. A no-impact call should be made for candidate species and species of concern.

SUF	INC	MIS	N/A	
☐	☐	☐	☐	N. Include a brief discussion of where EFH is found in the project action area, which species or species groups are within the action area it pertains to, and their use of habitat within the action area.
☐	☐	☐	☐	O. Discuss why likely impacts to the EFH of each species and/or species group for which it is present in the action area from construction and/or operation of the project will not occur.
☐	☐	☐	☐	P. A no-effect determination must be made for the EFH of each species group for which it is present in the action area, unless the impacts vary by species. Then the effect determination would be made at the individual species level.

Note: EFH pertains to both listed and unlisted species.

Comments:

_____
_____
_____
_____
_____
_____
_____

19.1.4 Old Format No-Effect Letter Checklist

This checklist (version 9a) was used by WSDOT reviewers to determine if all necessary information and whether sufficient detail was provided in a No Effect Letter.

Project Name: _____

Region, city or county: _____

Biologist name, affiliation and phone number: _____

Contact name, agency/region, phone number: _____

General comments:

_____
_____
_____
_____
_____
_____

Typically, the no-effect letter should be two to three pages in length, depending on the complexity of the proposed action. The purpose of the NE letter is to document and support the

no-effect determination(s). The focus of a NE letter should be a brief but complete project description, species habitat and occurrence information, analysis of project impacts, and justification for the no-effect determination. The NE letter should end with this language, "*It is our understanding that this satisfies our responsibilities under Section 7 (c) of the Endangered Species Act at this time, and we are sending you this copy of our assessment for your files. We will continue to remain aware of any change in status of these species and will be prepared to re-evaluate potential project impacts if necessary*."

Key:
SUF = Sufficient information contained in the NE letter.
INC = Incomplete or insufficient information to justify no-effect determination.
MIS = Missing information that is key to addressing potential impacts and justifying the no-effect determination.
N/A = Not applicable, the project does not require this information to justify the no-effect determination, or does not apply.

Remember, the level of detail should be commensurate with the effects of the action.

No-Effect Letters Should Include the Following Information:

SUF	INC	MIS	N/A	
☐	☐	☐	☐	A. Describe the overall **purpose of the project** and a brief summary of project objectives. Estimate the duration and the dates that the project will occur.
☐	☐	☐	☐	B. Cite species listings provided by NMFS and/or USFWS. Append a copy of the listing to the report. Species listings should be updated every 6 months (listings must not be more than 6 months old) or if there are status changes.
☐	☐	☐	☐	C. Provide a legal description (Section, Township, Range) and vicinity map that clearly shows the project in relation to nearby water bodies, sensitive habitats, etc.
☐	☐	☐	☐	*D. Photographs, especially color copies, are useful to orient the reviewer to the project area. A combination of aerial or orthophotos, and snapshots are ideal.*
☐	☐	☐	☐	E. List all proposed project related construction activities and types of equipment. Describe expected noise and disturbance issues. Estimate timing (daylight/nighttime) of project activities. Include all phases or stages of the project. Include any secondary project features such as mitigation, staging areas, detours, waste and stockpile sites, etc.

SUF INC MIS N/A ☐ ☐ ☐ ☐ F. Date of field review(s) of project, personnel involved, and results of visit(s).

SUF INC MIS N/A ☐ ☐ ☐ ☐ G. Describe the project setting in terms of physiographic region, general topography, dominant habitat and vegetation type(s), aquatic resources, land use patterns and existing disturbance levels from human activities, roadways, etc.

SUF INC MIS N/A ☐ ☐ ☐ ☐ H. Describe the potential suitable habitat for the species found on-site or in the project vicinity. Reference WDFW PHS data, State salmonid stock inventories, and consult WDFW/Tribal habitat biologists for species use in the project vicinity.

SUF INC MIS N/A ☐ ☐ ☐ ☐ I. Include a brief discussion of where EFH is found in the project action area, which species or species groups are within the action area it pertains to, and their use of habitat within the action area.

SUF INC MIS N/A ☐ ☐ ☐ ☐ J Quantify area of habitat disturbance as it relates to the species being addressed. Examples include: vegetation removal (include species and size [height and dbh]), stream substrate disturbance, proposed earthwork, increase in impervious surface, etc.

SUF INC MIS N/A ☐ ☐ ☐ ☐ K. Discuss why likely impacts on the listed species and their habitat from construction and/or operation of the project will not occur (one paragraph per species).

SUF INC MIS N/A ☐ ☐ ☐ ☐ L. Discuss why likely impacts on the EFH of each species and/or species group for which it is present in the action area from construction and/or operation of the project will not occur.

SUF INC MIS N/A ☐ ☐ ☐ ☐ M. A no-effect determination must be made for each listed species as well as designated critical habitat (if appropriate). It must provide supporting evidence to justify the no-effect determination. A "no jeopardy" call and a conditional (upon listing) no-effect determination should be made for proposed species. A "no impact" call should be made for candidate species and species of concern.

SUF INC MIS N/A ☐ ☐ ☐ ☐ N. A no adverseeffect determination must be made for the EFH of each species group for which it is present in the action area, unless the impacts vary by species. Then the effect determination would be made at the individual species level.

Note: EFH pertains to both listed and non-listed species.

Comments:

19.2 Submitting a Biological Assessment

BA recipients, copy recipients, required attachments, and contacts for coordinating consultation for WSDOT projects are listed in Tables 19-1 and 19-2. A finished BA includes vicinity and site maps, and site photographs. Project diagrams are included when appropriate. A BA submitted to the USFWS (other than an eastern Washington programmatic BA) must include a copy of the species list obtained from the USFWS.

A nonfederal agency (such as WSDOT) that is named by a federal action agency as its nonfederal designee may submit a BA for informal consultation.

Formal consultation packages are submitted to the Service(s) by the federal action agency. For a formal consultation, WSDOT mails hard copies of the BA along with a cover letter providing the project number, project description, and effect determinations to the federal action agency.

If a project is conducted by FHWA and requires a permit from the Corps of Engineers, the Corps receives a copy of the BA.

Each BA should be submitted with a cover letter to the Services. Examples of cover letters for initiating an informal or formal consultation and submitting an informal or formal BA are given in Sections 19.2.1 and 19.2.2.

19.2.1 Informal Consultation

19.2.1.1 Example of Cover Letter for Initiating Informal Consultation with the U.S. Fish and Wildlife Service

Date

Name of current manager
U.S. Fish and Wildlife Service
Address for western Washington USFWS office or Spokane field office

Subject: Biological assessment for SR 105 North Cove Erosion Protection, MP 20.15 to 20.49
WSDOT project No. _____
Federal aid No. _____

Dear *name of current manager*:

The Washington State Department of Transportation (WSDOT), on behalf of the Federal Highway Administration (FHWA) is planning to complete an erosion protection project on SR 105 this winter. The project is located on SR 105 from milepost (MP) 20.15 to MP 20.49, along the edge of Willapa Bay in Pacific County (T14N R14W S04). The project includes funding from the FHWA. Therefore, it is subject to requirements under Section 7(c) of the Endangered Species Act.

If the project has been presented at a pre-BA meeting with the Services, include this following paragraph: This project was presented at a pre-biological assessment meeting with the U.S. Fish and Wildlife Service (USFWS) and the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) on *date*. In attendance were *names of attendees* from the USFWS and *names of attendees* from NOAA Fisheries.

Give names of species assessed: The enclosed biological assessment analyzes potential impacts of the proposed project on bald eagle, brown pelican, bull trout, marbled murrelet, northern spotted owl, Oregon silverspot butterfly, short-tailed albatross, western snowy plover, and green, leatherback, loggerhead and olive ridley sea turtles, as well as western snowy plover critical habitat, marbled murrelet critical habitat, and proposed critical habitat for bull trout.

State BA conclusions: The biological assessment concludes that the project *may affect is not likely to adversely affect* marbled murrelet, and will have *no effect* on bald eagle; brown pelican; northern spotted owl; Oregon silverspot butterfly; short-tailed albatross; western snowy plover; green, leatherback, loggerhead, and olive ridley sea turtles; critical habitat for western snowy plover and marbled murrelet; and proposed critical habitat for bull trout. We have determined that this project *will not destroy or adversely modify* bull trout critical habitat. However, if bull trout critical habitat becomes designated prior to completion of the project, the project will have *no effect* on bull trout critical habitat.

It is our understanding that with federal concurrence this satisfies our responsibilities under Section 7(c) of the Endangered Species Act at this time. We will continue to remain aware of any change in status of these species and will be prepared to reevaluate potential project impacts if necessary.

Please contact *project biologist name* at *telephone number* if you require additional information or if you have any questions about this project.

Sincerely,

Name of biology program manager
Title of biology program manager

Enclosure: Biological assessment

cc: w/ enclosure: *Name of regional environmental manager,* WSDOT *region*
Name of regional biology branch manager, WSDOT *region*
Area engineer, FHWA
Corps liaison (if this is an FHWA project requiring a Corps permit)

19.2.1.2 Example of Cover Letter for Initiating Informal Consultation with NOAA Fisheries

Date

Washington State Director for Habitat Conservation
NOAA Fisheries
Habitat Program/Olympia Field Office
510 Desmond Dr. SE, Suite 103
Lacey, Washington 98503-1273

Subject: Biological assessment for SR 105 North Cove Erosion Protection, MP 20.15 to 20.49
WSDOT Project No. _____
Federal aid No. _____

Dear *name of current director*:
The Washington State Department of Transportation (WSDOT), on behalf of the Federal Highway Administration (FHWA), is planning to complete an erosion protection project on SR 105 this winter. The project is located on SR 105 from milepost (MP) 20.15 to MP 20.49, along the edge of Willapa Bay in Pacific County (T14N R14W S04). The project includes funding from the FHWA. Therefore, it is subject to requirements under Section 7(c) of the Endangered Species Act.

If the project has been presented at a pre-BA meeting with the Services, include this paragraph:
This project was presented at a pre-biological assessment meeting with the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) on *date*. In attendance were *names of attendees* from NOAA Fisheries and *names of attendees* from USFWS.

The enclosed biological assessment analyzes potential impacts of the proposed project on Steller sea lion and green, leatherback, loggerhead, and olive ridley sea turtles, as required under Section 7(c) of the Endangered Species Act.

The biological assessment concludes that the project *may affect but is not likely to adversely affect* Steller sea lions, and will have *no effect* on sea turtles. Southern resident killer whales are proposed for listing as threatened under the Endangered Species Act.

We have determined that this project *will not jeopardize the continued existence of* southern resident killer whales. However, if southern resident killer whales become listed prior to completion of the project, the project *may affect but is not likely to adversely affect* southern resident killer whales.

Therefore, WSDOT is requesting informal consultation on Steller sea lions and informal conference on southern resident killer whales.

It is our understanding that with federal concurrence this satisfies our responsibilities under Section 7(c) of the Endangered Species Act at this time. We will continue to remain aware of any change in status of these species and will be prepared to reevaluate potential project impacts if necessary.

In compliance with the Magnuson-Stevens Fishery Conservation and Management Act, essential fish habitat (EFH) was assessed for the project. It was determined; the project *will not have an adverse effect on EFH*.

Please contact *name of project biologist* at *telephone number* if you require additional information or have any questions about this project.

Sincerely,

Name of biology program manager
Title of biology program manager

Enclosure: Biological assessment

cc: w/ enclosure: *Name of environmental manager,* WSDOT *region*
Name of regional biology branch manager, WSDOT *region*
Name of area engineer, FHWA
Corps liaison (if this is an FHWA project requiring a Corps permit)

19.2.2 Formal Consultation

19.2.2.1 Example of Cover Letter for a Federal Action Agency for Its Initiation of Formal Consultation with the U.S. Fish and Wildlife Service or NOAA Fisheries

The federal action agency (FHWA or Corps of Engineers) initiates formal consultation with the Services. WSDOT provides the federal action agency with a formal draft cover letter containing a project description and the effect determinations:

Date

Subject: Biological assessment for SR 105 SR 101 to Grays Harbor County Line bridge replacement, Milepost _____
Federal aid No. _____
WSDOT project No. _____

The Federal Highway Administration (FHWA) is providing funds to the Washington State Department of Transportation (WSDOT) to … *or*

The U.S. Army Corps of Engineers is issuing a permit to the Washington State Department of Transportation (WSDOT) to …
conduct a bridge replacement project on State Route 105 in Pacific County, Washington. The project is located on SR 105 from MP 20.15 to MP 26.49, in Pacific County (T14N R14W).

The project will replace the super structure of an existing bridge (bridge platform, supports, rails, roadway and striping) but will make use of existing piles and bridge foundations and requires no in-water work. The project is scheduled between June 15, 2005 and July 15, 2005. A total of one month will be required to complete work.

The enclosed biological assessment was prepared on our behalf by WSDOT for listed species as required under Section 7(c) of the Endangered Species Act. The biological assessment concludes that the project *may affect and is likely to adversely affect* bald eagle and marbled murrelet as a result of the proposed construction activities in close proximity to bald eagle nest sites and unsurveyed suitable marbled murrelet nesting habitat. Additionally, the biological assessment concludes that the proposed project will have *no effect* on marbled murrelet critical habitat, western snowy plover critical habitat, and Oregon silverspot butterfly; and *may affect but is not likely to adversely affect* bull trout, brown pelican, northern spotted owl, and western snowy plover.

Therefore, we are requesting formal consultation on the bald eagle and marbled murrelet, and informal consultation on bull trout, brown pelican, northern spotted owl, and western snowy plover.

It is our understanding that following the completion of formal consultation on bald eagle and marbled murrelet, and receiving concurrence on bull trout, brown pelican, northern spotted owl, and western snowy plover, our responsibilities under Section 7 (c) of the Endangered species Act

will be satisfied. Please contact *name of project biologist* (WSDOT *telephone number*) if you require additional information or have any questions about this project.

cc: *Name of environmental manager, WSDOT region*
Name of area engineer, WSDOT region, title of area engineer
Name of regional biology branch manager, WSDOT
Corps liaison (if this is an FHWA project requiring a Corps permit)

19.2.3 New WSDOT Biological Assessment Form

The compact disc accompanying this manual contains the new WSDOT BA form (template).

19.2.4 New WSDOT Biological Assessment Form Review Checklist

Project name: _____
Region, city, or county: _____
Biologist name, affiliation, and phone number: _____
Contact name, agency/region, and phone number: _____

General comments: _____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Key: **SUF = Sufficient information** contained in BA; **INC = Incomplete** or insufficient information to justify effect determination; **MIS = Missing** information that is key to addressing potential impacts and justifying determinations of effect. **N/A = Not applicable**, the project does not require this information to justify the effect determination, or does not apply. ***Remember, the level of detail should be commensurate with the effects of the action.*** *Required information is not shaded, items that are shaded are highly recommended to support the analysis and justify the effect determination.*

Biological assessments should include the following information:

Project description. Describe in detail the type and scope of action proposed. Use plain language and avoid engineering jargon with no explanation, for example, signalization and channelization. To a fish biologist, channelization means straightening and ditching a stream. To a road engineer, it means turn lanes. The following items should be addressed:

SUF ☐ INC ☐ MIS ☐ N/A ☐

A. Provide **project location** information: state route, milepost start and end, TRS numbers, and watershed information including WRIA and 6th field HUC. If doing in-water work, include river mile. Provide vicinity map.

SUF ☐ INC ☐ MIS ☐ N/A ☐

B. Provide **project overview** that describes the purpose and need for the project and a summary of the full scope of project activities. Regulatory m**itigation requirements** or activities should be identified and described.

SUF ☐ INC ☐ MIS ☐ N/A ☐

B. Summarize any **environmental benefits** associated with the project. If applicable, describe **conservation measures** or recommendations (i.e. components of the project that may benefit or promote the recovery of listed species and are included as an integral part of the proposed project). Conservation measures should be discussed with the project engineer to insure that they are feasible for the project.

SUF INC MIS N/A ☐ ☐ ☐ ☐

C. Describe the **existing conditions** associated with the project (i.e. existing culvert, bridge scour hole).

SUF INC MIS N/A ☐ ☐ ☐ ☐

D. Describe the **replacement structure or facility or repair.** Include information on staging areas, cut and fill amounts, riprap amounts and placement, in water work activities, etc.

For pile driving, describe the number of piles, size, depth, material, substrate, pile driver type, equipment used, etc.

SUF INC MIS N/A ☐ ☐ ☐ ☐

E. **Project footprint description**: Quantify areas of **temporary and permanent impacts**.

SUF INC MIS N/A ☐ ☐ ☐ ☐

F. Provide a **general project timeline**, including start, stop and total # of working days.

SUF INC MIS N/A ☐ ☐ ☐ ☐

G. Include **simple plan sheets or overview of alignment** showing where work is proposed relative to sensitive areas and/or habitat. Work Items can include construction staging areas, clearing limits, location of BMPs, OHWM, primary and secondary project features.

Proposed Project Actions: The proposed project should be **deconstructed** into its constituent parts. Provide additional information or use the appropriate module or modules to describe each project activity in detail. As necessary, duplicative information should be eliminated.

SUF INC MIS N/A ☐ ☐ ☐ ☐

H. Describe any **detours** that the project may be constructing or using.

SUF INC MIS N/A ☐ ☐ ☐ ☐

I. Describe **construction access** (Access Road(s), Fill, Bridge(s), Barge(s)) and **staging areas**.

SUF INC MIS N/A ☐ ☐ ☐ ☐

J. Describe **proposed grading, recontouring, reshaping** or other earthwork, associated with the proposed activities.

SUF INC MIS N/A ☐ ☐ ☐ ☐

K. Describe any **paving activities** that the project may be completing.

SUF INC MIS N/A ☐ ☐ ☐ ☐

L. Describe any **pavement removal** that the project may be completing.

SUF INC MIS N/A ☐ ☐ ☐ ☐

M. Describe any **pavement replacement** that the project may be completing.

SUF INC MIS N/A ☐ ☐ ☐ ☐

N. **New impervious surface:** Provide information on how much new impervious surface (NIS) the project is creating, the amount of pollution generating impervious surface and the amount of nonpollution generating surfaces.

Describe the water quality and flow control BMPs that will be used. Describe the location of the facilities and outfalls. Include the effects of constructing these facilities and an analysis of their effectiveness in reducing potential impacts in the effect analysis.

SUF INC MIS N/A ☐ ☐ ☐ ☐

O. Quantify disturbance to **vegetation/clearing**. Describe temporary and permanent impacts.

SUF INC MIS N/A ☐ ☐ ☐ ☐

P. Describe **noise generating activities** and whether **noise attenuation measures or monitoring** will be implemented.

SUF INC MIS N/A ☐ ☐ ☐ ☐

Q. Quantify disturbance to **aquatic habitats including wetland impacts, and stream impacts.** Is a HPA required? Describe how fish exclusion, dewatering and fish moving will be completed.

SUF INC MIS N/A ☐ ☐ ☐ ☐

R. If **excavation below OHWM** is required, describe activities and quantify impacts.

SUF INC MIS N/A ☐ ☐ ☐ ☐

S. If **placement of fill below OHWM** is required, describe activities, types of materials to be placed, and quantify impacts.

SUF INC MIS N/A ☐ ☐ ☐ ☐

T. If **bank protection** is required, describe activities and quantify impacts.

SUF INC MIS N/A ☐ ☐ ☐ ☐

U. Describe **in-water work**; include stream bypass, dewatering, fish exclusions, and fish moving.

For **pile driving,** describe if monitoring will occur, the tide cycle or water dept, if a barge will be used, how it will be anchored, and where materials will be disposed of and stored.

SUF INC MIS N/A ☐ ☐ ☐ ☐

V. If **fish removal/exclusion** is required, describe activities and quantify impacts. Be sure to consult WSDOT Fish Removal Protocols and Standards (an in-water work fish removal monitoring report will need to be submitted to NOAA Fisheries or USFWS within 60 days following fish removal).

SUF INC MIS N/A ☐ ☐ ☐ ☐

W. If **Stream Bypass/Dewatering or Separation of Work Area from Surface Water** is required, describe activities and quantify impacts.

SUF INC MIS N/A

☐ ☐ ☐ ☐

X. Provide a **detailed project timeline and sequence of when activities will occur**, including start, stop and total # of working days for each project element. Provide in-water work window, and identify the time work will occur in the water. Provide hours of operation, specify day or night, time of year (months and year), duration. Also include the equipment list.

For **pile driving** describe if work will occur day or night, how long it will take to drive each pile, how many piles will be driven per day, and if a noise attenuation device will be employed.

If details are unavailable, identify a potential work window using the worst-case scenario.

Project description comments:

_____
_____
_____
_____

Project vicinity. The following items should be addressed as appropriate:

SUF INC MIS N/A

☐ ☐ ☐ ☐

A. Describe the **project setting** in terms of physiographic region, general topography, land use patterns and existing disturbance levels from human activities, roadways, etc.

SUF INC MIS N/A

☐ ☐ ☐ ☐

B. Provide **project vicinity** information: watershed information including WRIA and 6th field HUC, dominant habitat and vegetation type(s), aquatic resources, wetlands, geology and soils. Provide vicinity map.

Project vicinity comments:

_____
_____
_____
_____
_____

Effects of Project on Environment – Identify all Physical, Biological, Chemical Effects associated with each of the project activities. The following items should be addressed as appropriate:

SUF INC MIS N/A

☐ ☐ ☐ ☐

A. **Describe direct and indirect effects and effects from interrelated and interdependent activities**. Impacts should be described for each of the activities or project elements identified in the Proposed Project Actions section of the BA. Determine the geographic area that will be affected by each impact.

See WSDOT's indirect effects guidance. **The action area must include the extent of these impacts.**

Interdependent actions are actions that have no independent utility apart from the primary action. Interrelated actions are actions that are part of the primary action and dependent upon that action for their justification. Both types of actions **would not occur *if not for* the proposed action**.

Effects of project on the environment comments:

_____
_____
_____
_____
_____

Impact Minimization Measures – Identify all minimization measures and BMPs that will be implemented to address each anticipated impact. The following items should be addressed as appropriate:

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. **Avoidance and minimization measures:** List the impact minimization measures, the appropriate best management practices, and for performance based BAs, the performance standards. Potential measures include: timing restrictions for all or some of the activities; clearing limitations; avoidance of specific areas; special construction techniques; HPA conditions; replanting with native vegetation; potential of habitat enhancement (i.e., fish passage barrier removal); best management practices, etc. If applicable, append a copy of the HPA, specs. for BMPs, or other documentation to support the implementation of the minimization measure.Ensure that these measures do not conflict with WSDOT (or the local agencies) standard specifications, and that the project engineer has approved them.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. Include a **description of any proposed monitoring** of the species, its habitat and minimization measure effectiveness.

SUF INC MIS N/A
☐ ☐ ☐ ☐

C. Measures should be clearly stated so they can be **easily incorporated into contract plans and implemented**.

SUF INC MIS N/A
☐ ☐ ☐ ☐

D. **Provide a summary of the avoidance and minimization measures.** These tie into the effects analyses (for the environment and for species and critical habitat) and need to be summarized in one place to allow the project engineer to know what the restrictions are on the project.

Impact minimization measures comments:

_____
_____
_____
_____
_____

Description of the project action area. The following items should be addressed as appropriate:

SUF ☐ INC ☐ MIS ☐ N/A ☐

A. **Define the action area** (area of potential impacts associated with **direct and indirect effects and effects from interrelated and interdependent activities** taking into consideration the impact minimization measures that will be implemented.) The action area is usually larger than the project area or project vicinity (i.e., the river upstream and downstream from a bridge project, water bodies where fish may access after replacing a barrier, detour routes (if applicable), wetland or other mitigation sites resulting from project impacts). Include *all* areas, including mitigation areas and other areas located outside of the immediate project area that may be affected by project activities.

Include a figure showing the defined action area.

Description of the project action area comments:

_____
_____
_____
_____
_____

Species lists and Endangered, threatened, and proposed species and designated habitat occurrence. The BA should be based on current site-specific information about the species and its life history. Be sure to cite any relevant scientific literature or research findings as referenced. The following items should be addressed:

SUF ☐ INC ☐ MIS ☐ N/A ☐

A. Cite species listings provided by NMFS and/or USFWS. Species listings should be updated every 6 months (listings must not be more than 6 months old) or if there are status changes. USFWS listings for western Washington may be obtained from the agency website: <http://westernwashington.fws.gov/se/SE_List/endangered_Species.asp>.

NOAA listings may be obtained from http://www.nwr.noaa.gov/ >.

SUF ☐ INC ☐ MIS ☐ N/A ☐

B. Identify any **listed or proposed species**, and **designated or proposed critical habitat**, that are **known or have the potential to occur** on site or in the project action area. Cite the Federal Register notice of listing status or proposal for listing. Identify fish by ESU or DPS. Discussion included about individual species should focus primarily on site-specific information. Candidate species can be addressed in the appendix.

SUF INC MIS N/A ☐ ☐ ☐ ☐

C. Provide information on the species listed on the county or statewide species list that will not be addressed in the BA, and why they will not be addressed.

SUF INC MIS N/A ☐ ☐ ☐ ☐

D. Describe the **species, the potential suitable habitat** and **critical habitat** for the species found on site or in the project action area and how local populations use it. Discuss the **local status** of the species as appropriate. Determine the likely level and type of use of the area by each species. Describe the habitat in the action area for the species. A lengthy life history is not required.

SUF INC MIS N/A ☐ ☐ ☐ ☐

E. If relevant, describe any efforts to determine the status of the species in the project area, including information on **survey methods, timing and results of surveys** for species or suitable habitat identification. *If suitable habitat is present, species presence should be assumed until adequately proven otherwise.*

SUF INC MIS N/A ☐ ☐ ☐ ☐

F. Include any information received from **biologists with special expertise** on the species or location, such as WDFW, tribal, Forest Service, or other local, regional, and university fish, wildlife, and habitat biologists and plant ecologists. Include conversations cited as pers. comm. in the References section, and document their area of expertise.

Listed and proposed species and habitat occurrence comments:

_____

_____

_____

Environmental baseline information for the action area. Provide information on the habitat types in the action area.

SUF INC MIS N/A ☐ ☐ ☐ ☐

A. Describe the **environmental baseline (current or pre-project) condition** of the habitat and the project area. The baseline description should address all pertinent habitat parameters for the species. Where appropriate, address aquatic baseline conditions using the matrix of pathways and indicators (MPI) for the appropriate species. Describe the current or pre-project condition of the habitat in the action area and if it will be degraded, maintained or improved (restored). Address the MPI only if in-water work will occur, and include the actual chart in the body of the document. In the document, address only those indicators that may be impacted by the project. Additional information on the rest of the indicators may be provided in the appendix. Decide if the indicators will be addressed at the project level or action area level in addition to the watershed level.

SUF INC MIS N/A ☐ ☐ ☐ ☐

B. Date of **field review**(s) of project, personnel involved, and results of visit(s).

Effects of Project on Species and Critical Habitats: Provide a thorough analysis of the effects of the proposed project on the species and its habitat within the action area. An exposure analysis for each species associated with each potential impact should be completed first followed by response analyses as necessary. The following items should be addressed:

SUF INC MIS N/A ☐ ☐ ☐ ☐

A. **Direct effects:** Describe and analyze the **effects of the action that would directly affect the species, suitable habitat and food resources**. Describe anticipated effects that would potentially remove or destroy habitat, displace or otherwise influence the species, either positively (beneficial effects) or negatively (adverse effects). Analyses are completed for each species. For each species this analysis addresses each direct effect to which the specific species or critical habitat will be exposed.

SUF INC MIS N/A ☐ ☐ ☐ ☐

B. Describe potential for **impacts from disturbance** (i.e., noise above ambient levels, sudden loud noises, increased human activity), **from construction and continuing operation.** Construction impacts would be considered direct effects whereas operation noise impacts could be considered indirect effects (occur later in time).

SUF INC MIS N/A ☐ ☐ ☐ ☐

C. **Indirect effects:** Describe any **indirect impacts** (those that occur later in time generally after the construction period) such as impacts to future food resources or habitat, and impacts from increased long-term human access or project-induced growth. Analyses are completed for each species. For each species this analysis addresses each indirect effect to which the specific species or critical habitat will be exposed.

SUF INC MIS N/A ☐ ☐ ☐ ☐

D. **Interrelated and interdependent activities:** Analyses are completed for each species. For each species this analysis addresses each effect (associated with these activities) to which the specific species or critical habitat will be exposed

SUF INC MIS N/A ☐ ☐ ☐ ☐

F. **Cumulative effects:** Identify those **cumulative effects** within the action area (defined as future state or private actions) that are reasonably certain to occur. Cumulative effects are not used to make the effect determination, but must be provided to the Services for their analysis. Please note that this definition differs from that used under NEPA as it does ***not include future federal actions***. **Cumulative effects analyses are required for formal consultations (*likely to adversely affect*) only.**

SUF INC MIS N/A ☐ ☐ ☐ ☐

G. If species-specific **recovery, management, and/or watershed plans** have been established, address the project in terms of compliance and recommendations.

SUF INC MIS N/A ☐ ☐ ☐ ☐

H. For **proposed species**, analyze the potential for the project to jeopardize the continued existence of the species. In addition to a jeopardy call the BA should make a provisional effect determination.

SUF INC MIS N/A ☐ ☐ ☐ ☐

I. Discuss any **potential *take*** of listed species. This must be unavoidable and quantified if an incidental *take* permit is being requested.

SUF INC MIS N/A ☐ ☐ ☐ ☐

J. The BA must contain a **distinct statement of the overall effect of the project on each species**. It must also provide supporting evidence to justify the effect determination (for listed species) or jeopardy call (for proposed species). The determination must be consistent throughout and worded correctly.

Analysis of effects on listed species comments:

_____
_____
_____
_____
_____

Analysis of impacts on candidate species, species of concern, and other sensitive wildlife. Depending upon the scope of the project the BA should address federal candidate and species of concern, as well as state listed species, PHS resources, tribal resources, and Forest Service sensitive species. Although the ESA may not apply to these species, if significant impacts could occur, they should be discussed commensurate with the issues. This could also help avoid future listings. This section should be placed in the appendix. The following items should be addressed:

SUF INC MIS N/A ☐ ☐ ☐ ☐

A Indicate the potential suitability of habitat in or near the project. Indicate the known or likely potential level of use of the site or project vicinity by the species.

SUF INC MIS N/A ☐ ☐ ☐ ☐

B. These species can be addressed in guilds (species with similar life histories or habitat requirements), for example all bat species, amphibians, or aquatic species can be lumped together.

SUF INC MIS N/A ☐ ☐ ☐ ☐

C. Describe any potential direct or indirect impacts on the species, (i.e., habitat loss, disturbance, etc.).

SUF INC MIS N/A ☐ ☐ ☐ ☐

D. Species other than federally listed species, such as those mentioned above (state listed, Forest Service, tribal, PHS, etc.) could be mentioned here as appropriate.

SUF INC MIS N/A ☐ ☐ ☐ ☐

E. Impact assessment for these species should indicate whether the project is likely to significantly impact their populations or important habitat components.

Analysis of impacts on candidates and species of concern comments:

_____
_____
_____
_____
_____

Conclusions and effect determinations: Summarize the proposed project and objectives, and restate the listed species that may occur near the project and the expected level of use. State what conclusions regarding potential impacts to the species discussed can be supported from the information presented in the report. The following items should be addressed:

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. A **determination of effect** must be made for each threatened and endangered species as well as any designated critical habitat.* The format of the effect determination should include a list of all the factors that could affect the species followed by list of justifications for why it leads to the identified effect determination. For each, only one of the following determinations of effect is acceptable.

- *Beneficial effect* (by definition cannot be *no effect*, must also be one of the *may affect* calls);
- No effect (absolutely **no** effect whatsoever);
- *May affect, not likely to adversely affect* (insignificant—never reaches level where *take* occurs, or discountable—extremely unlikely to occur); or
- *May affect, likely to adversely affect* (measurable or significant effects).

* In addition to the determination of effect made for designated critical habitat, you must also determine whether the action will **destroy or adversely modify** designated critical habitat and address the relevant Primary Constituent Elements (PCEs) of the critical habitat. The format of the effect determination should include a list of all the factors that could affect the critical habitat PCEs followed by list of justifications for an overall effect determination for critical habitat that takes these PCE impacts into consideration.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. For any **proposed species or proposed critical habitat** discussed, the conclusions should indicate whether the proposed project is likely to **jeopardize** the continued existence of the species (as in the entire species, not individual(s)), or destroy or adversely modify the proposed critical habitat**. A **conditional effect determination** is also recommended in the event that the species is listed prior to project completion.

** The conclusions should address the relevant Primary Constituent Elements (PCEs) of the critical habitat and provide justifications for an overall effect determination for critical habitat that takes these PCE impacts into consideration.

SUF INC MIS N/A
☐ ☐ ☐ ☐

C. For species discussed that are not afforded protection under ESA (i.e**., candidates, species of concern, state listed species**, etc.), the conclusions should indicate whether the project is likely to significantly impact populations, individuals or suitable (occupied or unoccupied) habitat. This analysis should be included with the rest of the candidate species section in the appendix.

Conclusions and effect determinations comments:

_____
_____
_____
_____
_____
_____

References and appendices: Refer to all appropriate project documents, particularly if the assessment depends upon information located elsewhere (e.g., in an EIS or EA). You should consider providing the Service with copies of pertinent documents along with the BA. Ideally, the BA will be a complete stand-alone document for ESA purposes. The following items should be addressed:

SUF ☐ INC ☐ MIS ☐ N/A ☐

A. Include as appropriate: any photographs; simple project plans; survey methods, protocols and results; and copies of the listing letters from NMFS and USFWS; hydraulic project approval (WDFW); planting plans; hydraulic report; NMFS baseline checklist; stormwater guidance, etc.

SUF ☐ INC ☐ MIS ☐ N/A ☐

B. Provide **citations** for other information referred to in the BA, such as current literature and personal contacts used in the assessment. Include name, affiliation, and date. Use as the most recent references available on each species and topic.

SUF ☐ REMOVE ☐

C. In the final document, **do not include** copies of PHS maps or site-specific habitat resource maps, or tabular data **if they contain details on sensitive information such as nest site locations or congregation areas.** Information on some listed species should not be included in a public document. This information can accompany the document to aid the reviewer but should not be incorporated into the document.

References and appendix comments:

_____
_____
_____
_____
_____

Additional comments:

_____
_____
_____
_____
_____

Essential fish habitat (EFH): This section should be included in the appendix. EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH assessments must include a brief description of what EFH is, where it is located within the action area, a description of the project actions, an analysis of effects, including cumulative effects, of the proposed action on EFH, and an effects determination for the EFH of each species and/or species group for which habitat is present. When integrated with a biological assessment prepared for Section 7 consultation, elements of the project description, impact analysis, and conservation measures that are included in the ESA portion of the BA may be referenced in the EFH portion to avoid redundancy.

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. Provide a brief description of what EFH is, why it must be addressed, where it is found in the project action area, which species or species groups are within the action area it pertains to, and their use of habitat within the action area (significant prey species should also be considered). For the Pacific Coast salmon fishery, identify species (coho, chinook, and/or pink). Otherwise, identify species group (groundfish and/or coastal pelagics).*

* Note that EFH pertains to both listed and non-listed species. For example, an EFH analysis may still be required when a project does not occur within the ESU of a listed species, but where chinook, pink, or coho salmon or groundfish occur. Additional guidance for integrating ESA and EFH consultations may be found at: < http://www.nwr.noaa.gov/Salmon-Habitat/Essential-Fish-Habitat/upload/EFH-assess.pdf>.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. Include a brief statement of **potential impacts (including beneficial effects) to EFH**, including a description of individual or cumulative adverse effects of the project on relevant EFH, the managed species or species groups, and associated species such as major prey species, referring as necessary to supporting material in the ESA portion of the BA.

SUF INC MIS N/A
☐ ☐ ☐ ☐

C. Include a description of **conservation measures** that will minimize or eliminate potential impacts to EFH and/or refer to appropriate conservation measures detailed in the ESA portion of the BA.

SUF INC MIS N/A
☐ ☐ ☐ ☐

D. A **determination of effect** must be made for the EFH of each species and/or species group for which it is present. If the effect determination will be different for a species of Pacific salmon, the determination is made for each species in the species group (e.g., chinook, coho and/or pink salmon). Otherwise, the determination of effect is made for the species group (e.g., Pacific salmonids, groundfish and/or coastal pelagics). It should state either *will not adversely effect/no adverse effect* or *may adversely effect* on EFH).

EFH additional comments:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

19.2.5 Old Format Biological Assessment Review Checklist (Version 9a)

This checklist is used by WSDOT reviewers to determine whether all necessary information has been provided in sufficient detail in a BA.

Project name: _____
Region, city, or county: _____
Biologist name, affiliation and phone number: _____
Contact name, agency/region, phone number: _ _____

General comments: _____

Key: **SUF = Sufficient information** contained in BA; **INC = Incomplete** or insufficient information to justify effect determination; **MIS = Missing** information that is key to addressing potential impacts and justifying determinations of effect. **N/A = Not applicable**, the project does not require this information to justify the effect determination, or does not apply. ***Remember, the level of detail should be commensurate with the effects of the action.*** *Required information is not shaded, items that are shaded are highly recommended to support the analysis and justify the effect determination.*

Biological Assessments Should Include The Following Information:

Project Description. Describe in detail the type and scope of action proposed. Use plain language and avoid engineering jargon with no explanation, for example, signalization and channelization. To a fish biologist, channelization means straightening and ditching a stream. To a road engineer, it means turn lanes. The following items should be addressed:

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. Describe the overall **purpose of the project** and a brief summary of project objectives. This should be a general statement, and not necessarily the NEPA purpose and need statement.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. List all proposed project related **construction activities** and types of equipment. Include sources of loud noise above ambient levels. Include all phases or stages of the project and include details about any structures altered or built by the proposed actions. Emphasis the ways the project was designed to reduce impacts on listed species such as the use of retaining walls.

SUF INC MIS N/A ☐ ☐ ☐ ☐

C. **Secondary project features** (i.e., wetland mitigation construction, staging areas, detours, waste and stockpile sites, safety clearing, work trestles and temporary work bridges, and demolition). Include mitigation activities required by regulatory agencies (i.e., WDFW, etc.) that are a part of the proposed actions.

SUF INC MIS N/A ☐ ☐ ☐ ☐

D. Include **simple plan sheets or overview of alignment** showing where work is proposed relative to sensitive areas and/or habitat.

SUF INC MIS N/A ☐ ☐ ☐ ☐

E. Quantify area of **vegetation removal**, include clearing and grubbing, vegetation type, replanting plans. For trees include species and size (height and dbh). Describe both temporary and permanent clearing.

SUF INC MIS N/A ☐ ☐ ☐ ☐

F. Provide a **chronology of when activities will occur**, timing of construction, phasing. Provide hours of operation, specify day or night, time of year (months and year), duration. If details are unavailable, identify a potential work window using the worst-case scenario.

SUF INC MIS N/A ☐ ☐ ☐ ☐

G. Describe **proposed grading and filling or other earthwork, include specific BMPs** for erosion, sedimentation, stormwater and spill control. If appropriate, append the TESC Plan, Spill Control Plan, BMP specifications, etc.

SUF INC MIS N/A ☐ ☐ ☐ ☐

H. Explain any expected changes to the **operation of the facility** (i.e., increased traffic, revised use patterns, new maintenance needs, etc.).

SUF INC MIS N/A ☐ ☐ ☐ ☐

I. **Stormwater treatment information**: Stormwater treatment information should not be in its own section but should be included in the project description. It should not be more that a couple of paragraphs long and should address: How much **new impervious surface (NIS)** is the project creating (including sidewalks, parking lots, etc. for which it is determined that stormwater treatment should be included), and how much of the NIS is being treated for stormwater (% or total amount)? What BMPs are proposed to treat NIS for quality and quantity? What is the receiving area/water body and overflow channel for each BMP? What is the amount of **existing (pre-project) impervious surface (EIS)** in project area? How much EIS is currently (pre-project) treated for stormwater? What BMPs are being used to treat EIS for quality, quantity and what are the receiving areas/water body for each BMP? How much of the untreated EIS is proposed for treatment as part of project? What BMPs are proposed for treatment of the untreated EIS identified above (quality, quantity, receiving area/water body)? Is off-site stormwater being treated in WSDOT stormwater facilities under pre-project conditions? If yes, will this treatment continue at the same level under the proposed project? Describe the location of the facilities and outfalls. Include the effects of constructing these facilities in the impact analysis.

SUF INC MIS N/A

☐ ☐ ☐ ☐

J. Describe **proposed in-water work** (below OHWM) and work over water bodies, and potential for impacts on riparian vegetation. Include conditions and **work windows** as described in the WDFW Hydraulic Project Approval and/or negotiated with USFWS and NMFS. State clearly if the project does not include any in-water or over water work. Include a figure showing locations of water bodies potentially affected by proposed in-water work.

Project Description Comments:

Description of the Project Action Area. The following items should be addressed as appropriate:

SUF INC MIS N/A

☐ ☐ ☐ ☐

A. **Define the Action Area** (area of potential impacts, both **indirect** and direct). The action area is usually larger than the project area or project vicinity (i.e., the river upstream and downstream from a bridge project, water bodies receiving stormwater, detour routes (if applicable), wetland or other mitigation sites resulting from project impacts). Include *all* areas, including mitigation areas and other areas located outside of the immediate project area that may be affected by project activities.

SUF INC MIS N/A

☐ ☐ ☐ ☐

B. Provide a **legal description** (Section, Township, Range) and **vicinity map** that clearly shows the project in relation to nearby water bodies, sensitive habitats, etc.

SUF INC MIS N/A

☐ ☐ ☐ ☐

C. Provide the location in the Sixth Field HUC.

SUF INC MIS N/A

☐ ☐ ☐ ☐

D. **Photographs**, especially color copies, are useful to orient the reviewer to the project area. A combination of aerial or orthophotos, and snapshots are ideal.

SUF INC MIS N/A

☐ ☐ ☐ ☐

E. Date of **field review**(s) of project, personnel involved, and results of visit(s).

SUF INC MIS N/A
☐ ☐ ☐ ☐

F. Describe the **environmental baseline (current or pre-project) condition** of the habitat and the project area. The baseline description should address all pertinent habitat parameters for the species. Where appropriate, address aquatic baseline conditions using the matrix of pathways and indicators (MPI) for the appropriate species. Only address the MPI if in water work will occur and include the actual chart in the body of the document. In the document only address those indicators that may be impacted by the project. Additional information on the rest of the indicators may be provided in the appendix. Decide if the indicators will be addressed at the project level or action area level in addition to the watershed level.

SUF INC MIS N/A
☐ ☐ ☐ ☐

G. Describe the **project setting** in terms of physiographic region, general topography, dominant habitat and vegetation type(s), aquatic resources, land use patterns and existing disturbance levels from human activities, roadways, etc.

SUF INC MIS N/A
☐ ☐ ☐ ☐

H. Include information about **past and present activities** in the area that relate to the species or its habitat and/or the proposed action. This could include past consultations and conservation measures, or species management plans.

Description of the Project Action Area Comments:

Endangered, Threatened and Proposed Species and Designated Habitat Occurrence. The BA should be based on current site-specific information about the species and its life history. Be sure to cite any relevant scientific literature or research findings as referenced. The following items should be addressed:

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. Cite **species listings** provided by NMFS and/or USFWS. Species listings should be updated every 6 months (listings must not be more than 6 months old) or if there are status changes. USFWS listings for Western Washington may be obtained from their web site: <http://westernwashington.fws.gov/se/SE_List/endangered_Species.asp>.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. Identify any **listed, proposed species**, and **designated or proposed critical habitat**, that are **known or have the potential to occur** on site or in the project action area. Cite the Federal Register notice of listing status or proposal for listing. Identify fish by ESU or DPS. Discussion included about individual species should focus primarily on site-specific information. Candidate species can be addressed in the appendix.

SUF ☐ INC ☐ MIS ☐ N/A ☐

C. Describe the **species, its habitat requirements and ecology** as it relates to the action area, and relate that to the local populations. A lengthy life history is not required, and can be incorporated by referencing appropriate listing documents. Enough information should be provided to adequately explain the potential impacts.

SUF ☐ INC ☐ MIS ☐ N/A ☐

D. Describe the **potential suitable habitat** and **critical habitat** for the species found on site or in the project action area and how local populations use it. Discuss the **local status** of the species as appropriate. Determine the likely level and type of use of the area by each species.

SUF ☐ INC ☐ MIS ☐ N/A ☐

E. If a No-Effect determination is made based on **lack of suitable habitat** for a particular species in the action area, this needs to be adequately justified and documented. Discuss the **habitat features or types that are available** as compared to the habitat features that define suitable habitat for each species.

SUF ☐ INC ☐ MIS ☐ N/A ☐

F. If relevant, describe any efforts to determine the status of the species in the project area, including information on **survey methods, timing and results of surveys** for species or suitable habitat identification. *If suitable habitat is present, species presence should be assumed until adequately proven otherwise*.

Listed and Proposed Species and Habitat Occurrence Comments:

Analysis of Effects on Listed and Proposed Species and Designated and Proposed Critical Habitat. Provide a thorough analysis of the proposed project on the species and its habitat within the Action Area. The following items should be addressed:

SUF ☐ INC ☐ MIS ☐ N/A ☐

A. Include any information received from **biologists with special expertise** on the species or location, such as WDFW, Tribal, USFS or other local, regional and university fish, wildlife and habitat biologists and plant ecologists. Include conversations cited as pers. comm. in the References section, and document what their expertise is in.

SUF ☐ INC ☐ MIS ☐ N/A ☐

B. Describe how the **environmental baseline** (current or pre-project condition of the habitat in the action area) will be degraded, maintained or improved (restored). Append the completed NMFS and/or USFWS Checklist for Documenting Environmental Baseline and Effects of Proposed Action(s) on Relevant Indicators. Only address the indicators that will be impacted by the project. Include the matrix of pathways and indicators (MPI) chart in the BA, but place the discussions of the non-impacted indicators in the appendix.

SUF INC MIS N/A ☐ ☐ ☐ ☐

C. **Direct Effects:** Describe and analyze the **effects of the action that would directly affect the species, suitable habitat and food resources**. Include actions that would potentially remove or destroy habitat, displace or otherwise influence the species, either positively (beneficial effects) or negatively (adverse effects).

SUF INC MIS N/A ☐ ☐ ☐ ☐

D. Describe potential for **impacts from disturbance** (i.e., noise above ambient levels, sudden loud noises, increased human activity), **from construction and continuing operation.** Construction impacts would be considered direct effects whereas operation noise impacts could be considered indirect effects (occur later in time).

SUF INC MIS N/A ☐ ☐ ☐ ☐

E. **Indirect Effects:** Describe any potential **indirect impacts** (those that occur later in time) such as impacts on future food resources or habitat, and impacts from increased long-term human access or project-induced growth. **The action area must include the extent of these impacts.**

SUF INC MIS N/A ☐ ☐ ☐ ☐

F. **Interrelated and Interdependent Activities:** Describe and analyze any potential effects from interdependent actions (actions that have no independent utility apart from the primary action) and interrelated actions (actions that are part of the primary action and dependent upon that action for their justification) on the species or habitat that **would not occur "if not for" the proposed action**.

SUF INC MIS N/A ☐ ☐ ☐ ☐

G. **Cumulative Effects:** Identify those **cumulative effects** within the action area (defined as future State or private actions) that are reasonably certain to occur. Cumulative effects are not used to make the effect determination, but must be provided to the Services for their analysis. Please note that this definition differs from that used under NEPA as it does not include future federal actions. **Cumulative effects analyses are required for formal consultations ("likely to adversely affect") only.**

SUF INC MIS N/A ☐ ☐ ☐ ☐

H. If species-specific **recovery, management, and/or watershed plans** have been established, address the project in terms of compliance and recommendations.

SUF INC MIS N/A ☐ ☐ ☐ ☐

I. For **proposed species**, analyze the potential for the project to jeopardize the continued existence of the species. In addition to a jeopardy call the BA should make a provisional effect determination.

SUF INC MIS N/A ☐ ☐ ☐ ☐

J. Discuss any **potential *take*** of listed species. This must be unavoidable and quantified if an incidental *take* permit is being requested.

SUF INC MIS N/A ☐ ☐ ☐ ☐

K. The BA must contain a **distinct statement of the overall effect of the project on each species**. It must also provide supporting evidence to justify the effect determination (for listed species) or jeopardy call (for proposed species). The determination must be consistent throughout and worded correctly.

Analysis of Effects on Listed Species Comments:

Analysis of Impacts on Candidate Species, Species of Concern and Other Sensitive Wildlife. Depending upon the scope of the project the BA should address federal candidate and species of concern, as well as state listed species, PHS resources, Tribal resources, and Forest Service Sensitive species. Although the ESA may not apply to these species, if significant impacts could occur, they should be discussed commensurate with the issues. This could also help avoid future listings. This section should be placed in the Appendix. The following items should be addressed:

SUF INC MIS N/A ☐ ☐ ☐ ☐ A. Indicate the potential suitability of habitat in or near the project. Indicate the known or likely potential level of use of the site or project vicinity by the species.

SUF INC MIS N/A ☐ ☐ ☐ ☐ B. These species can be addressed in guilds (species with similar life histories or habitat requirements), for example all bat species, amphibians, or aquatic species can be lumped together.

SUF INC MIS N/A ☐ ☐ ☐ ☐ C. Describe any potential direct or indirect impacts on the species, (i.e., habitat loss, disturbance, etc.).

SUF INC MIS N/A ☐ ☐ ☐ ☐ D. Species other than federally listed species, such as those mentioned above (State listed, Forest Service, Tribal, PHS, etc.) could be mentioned here as appropriate.

SUF INC MIS N/A ☐ ☐ ☐ ☐ E. Impact assessment for these species should indicate whether the project is likely to significantly impact their populations or important habitat components.

Analysis of Impacts on Candidates and Species of Concern Comments:

Recommended Conservation Measures. Describe components of the project that may benefit or promote the recovery of listed species and are included as an integral part of the proposed project. These conservation measures serve to minimize or compensate for project effects on the species under review. Recommendations should be discussed with the project engineer to insure that they are feasible for the project. Typically NMFS and USFWS require inclusion of the recommendations in the project as part of the conditions of their concurrence. The following items should be addressed:

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. Provide **specific recommendations**, as appropriate**, to reduce or eliminate the adverse effects of the proposed activity**. Potential measures include: timing restrictions for all or some of the activities; clearing limitations; avoidance of specific areas; special construction techniques; HPA conditions; replanting with native vegetation; potential of habitat enhancement (i.e., fish passage barrier removal); best management practices, etc. If applicable, append a copy of the HPA, specs. for BMP's, or other documentation to support the implementation of the conservation measure.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. These should be clearly stated so they can be **easily incorporated into contract plans and implemented**.

SUF INC MIS N/A
☐ ☐ ☐ ☐

C. Include a **description of any proposed monitoring** of the species, its habitat and conservation measure effectiveness.

Recommended Conservation Measures Comments:

Conclusions and Effect Determinations. Summarize the proposed project and objectives, and restate the listed species that may occur near the project and the expected level of use. State what conclusions regarding potential impacts on the species discussed can be supported from the information presented in the report. The following items should be addressed:

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. A **determination of effect** must be made for each threatened and endangered species as well as any designated critical habitat*. For each, only one of the following determinations of effect is acceptable:

- Beneficial effect (by definition cannot be no effect, must also be one of the may-affect calls);
- No effect (absolutely no effect whatsoever);
- May affect, not likely to adversely affect (insignificant - never reaches level where *take* occurs, or discountable - extremely unlikely to occur); or
- May affect, likely to adversely affect (measurable or significant effects).

* In addition to the determination of effect made for designated critical habitat, you must also determine whether the action will **destroy or adversely modify** designated critical habitat. The format of the effect determination should include a list of all the factors that could affect the species followed by list of justifications for why it leads to the identified effect determination.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. For any **proposed species or proposed critical habitat** discussed, the conclusions should indicate whether the proposed project is likely to **jeopardize** the continued existence of the species (as in the entire species, not individual(s)), or destroy or adversely modify the proposed critical habitat. A **conditional effect determination** is also recommended in the event that the species is listed prior to project completion.

SUF INC MIS N/A
☐ ☐ ☐ ☐

C. For species discussed that are not afforded protection under ESA (i.e**., candidates, species of concern, state listed species**, etc.), the conclusions should indicate whether the project is likely to significantly impact populations, individuals or suitable (occupied or unoccupied) habitat. This analysis should be included with the rest of the candidate species section in the appendix.

Conclusions and Effect Determinations Comments:

References and Appendices Refer to all appropriate project documents, particularly if the assessment depends upon information located elsewhere (e.g., in an EIS or EA). You should consider providing the Service with copies of pertinent documents along with the BA. Ideally, the BA will be a complete stand-alone document for ESA purposes. The following items should be addressed:

SUF ☐ INC ☐ MIS ☐ N/A ☐

A. Include as appropriate: any photographs; simple project plans; survey methods, protocols and results; and copies of the listing letters from NMFS and USFWS; Hydraulic Project Approval (WDFW); planting plans ; Hydraulic Report; NMFS Baseline Checklist; Stormwater guidance, etc.

SUF ☐ INC ☐ MIS ☐ N/A ☐

B. Provide **citations** for other information referred to in the BA, such as current literature and personal contacts used in the assessment. Include name, affiliation, and date. Use as the most recent references available on each species and topic.

SUF ☐ REMOVE ☐

C. In the final document, **do NOT include** copies of PHS maps or site-specific habitat resource maps, or tabular data **if they contain details on sensitive information such as nest site locations or congregation areas.** Information on some listed species should not be included in a public document. This information can accompany the document to aid the reviewer, but should not be incorporated into the document.

References and Appendices Comments:

Additional Comments:

Essential Fish Habitat (EFH). This section should be included in the appendix. EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. EFH assessments must include a brief description of what EFH is, where it is located within the action area, a description of the project actions, an analysis of effects, including cumulative effects, of the proposed action on EFH, and an effects determination for the EFH of each species and/or species group for which habitat is present. When integrated with a biological assessment prepared for Section 7 consultation, elements of the project description, impact analysis, and conservation measures that are included in the ESA portion of the BA may be referenced in the EFH portion to avoid redundancy.

SUF INC MIS N/A
☐ ☐ ☐ ☐

A. Provide a brief description of what EFH is, why it must be addressed, where it is found in the project action area, which species or species groups are within the action area it pertains to, and their use of habitat within the action area (significant prey species should also be considered). For the Pacific Coast salmon fishery, identify species (coho, chinook, and/or pink). Otherwise, identify species group (ground fish and/or coastal pelagics).*

* Note that EFH pertains to both listed and non-listed species. For example, an EFH analysis may still be required when a project does not occur within the ESU of a listed species, but where chinook, pink, or coho salmon or ground fish occur. Additional guidance for integrating ESA and EFH consultations may be found at: <http://www.nwr.noaa.gov/Salmon-Habitat/Essential-Fish-Habitat/upload/EFH-assess.pdf>.

SUF INC MIS N/A
☐ ☐ ☐ ☐

B. Include a brief statement of **potential impacts (including beneficial effects) to EFH**, including a description of individual or cumulative adverse effects of the project on relevant EFH, the managed species or species groups, and associated species such as major prey species, referring as necessary to supporting material in the ESA portion of the BA.

SUF INC MIS N/A
☐ ☐ ☐ ☐

C. Include a description of **conservation measures** that will minimize or eliminate potential impacts on EFH and/or refer to appropriate conservation measures detailed in the ESA portion of the BA.

SUF INC MIS N/A
☐ ☐ ☐ ☐

D. A **determination of effect** must be made for the EFH of each species and/or species group for which it is present. If the effect determination will be different for a species of Pacific salmon, the determination is made for each species in the species group (e.g., chinook, coho and/or pink salmon). Otherwise, the determination of effect is made for the species group (e.g., Pacific salmonids, groundfish and/or coastal pelagics). It should state either **"no adverse effect"** or **"adverse effect"** on EFH).

EFH Additional Comments:

20.0 Information on Listed Species

20.0 Information on Listed Species

This chapter contains the following information:

- Listed species in Washington under USFWS and NOAA Fisheries jurisdiction
- Working with listed salmonids—considerations and resources
- Wildlife sensitive periods calendar
- Identification window for threatened and endangered plants in Washington
- Recovery plans.

20.1 Listed Species in Washington under Jurisdiction of USFWS and NOAA Fisheries

Species lists can be obtained for species within Washington State from the following websites:

- NOAA Fisheries <http://www.nwr.noaa.gov/>
- USFWS Western Washington <http://westernwashington.fws.gov/se/splisttableMar05.pdf>
- WSFWS Eastern Washington <http://easternwashington.fws.gov/Images/UCFWO%20listed-candidate%20spp.doc>. Eastern Washington species lists can also be requested directly from the USFWS field office.

ENDANGERED, THREATENED, PROPOSED AND CANDIDATE SPECIES, CRITICAL HABITAT AND SPECIES OF CONCERN IN WESTERN WASHINGTON STATE

Revised 10/12/05

Endangered

Brown pelican (*Pelecanus occidentalis*)
Columbian white-tailed deer (*Odocoileus virginianus leucurus*)
Gray wolf (*Canis lupus*)
Leatherback sea turtle (*Dermochelys coriacea*)
Short-tailed albatross (*Phoebastria albatrus*)
Marsh sandwort (*Arenaria paludicola*) plant
Bradshaw's desert-parsley (*Lomatium bradshawii*) plant

Threatened

Bald eagle (*Haliaeetus leucocephalus*)
Bull trout (*Salvelinus confluentus*) - Columbia River *DPS and* Coastal/Puget Sound DPS
Canada lynx (*Lynx canadensis*)
Green sea turtle (*Chelonia mydas*)

Grizzly bear (*Ursus arctos = U.a. horribilis*)
Loggerhead sea turtle (*Caretta caretta*)
Marbled murrelet (*Brachyramphus marmoratus*)
Northern spotted owl (*Strix occidentalis caurina*)
Olive ridley sea turtle (*Lepidochelys olivacea*)
Oregon silverspot butterfly (*Speyeria zerene hippolyta*)
Western snowy plover (*Charadrius alexandrinus nivosus*)
Golden paintbrush (*Castilleja levisecta*) plant
Kincaid's lupine (*Lupinus sulphureus* ssp. *kincaidii*) plant
Nelson's checker-mallow (*Sidalcea nelsoniana*) plant
Water howellia (*Howellia aquatilis*) plant

Designated

Critical habitat for the marbled murrelet
Critical habitat for the northern spotted owl
Critical habitat for the western snowy plover (Pacific Coast population)
Critical habitat for Bull trout

Proposed

Dolly Varden (*Salvelinus malma*) similarity of appearance

Candidate

Fisher (West Coast DPS)

Mardon skipper (*Polites mardon*)
Mazama pocket gopher (*Thomomys mazama*)(includes ssp. *couchi, glacialis*, *louiei*, *melanops, pugetensis, tacomensis, tumuli, yelmensis*)
Oregon spotted frog (*Rana pretiosa*)
Streaked horned lark (*Eremophila alpestris strigata*)
Taylor's (Whulge or Edith's) checkerspot butterfly (*Euphydryas editha taylori*)
Yellow-billed cuckoo (*Coccyzus americanus*)
Northern wormwood (*Artemisia campestris* ssp. *borealis* var. *wormskioldii*) plant

Species of Concern, Animals

Aleutian Canada goose (*Branta canadensis leucopareia*)
Beller's ground beetle (*Agonum belleri*)
California bighorn sheep (*Ovis canadensis californiana*)
California floater (mussel) (*Anodonta californiensis*)
California wolverine (*Gulo gulo luteus*)
Cassin's auklet (*Ptychoramphus aleuticus*)
Cascades frog (*Rana cascadae*)
Coastal cutthroat trout (*Oncorhynchus clarki clarki*)
Columbia pebblesnail (*Fluminicola columbianus*) [great Columbia River spire snail]
Columbia torrent salamander (*Rhyacotriton kezeri*)
Destruction Island shrew (*Sorex trowbridgii destructioni*)
Fender's soliperlan stonefly (*Soliperla fenderi*)
Fringed myotis (bat) (*Myotis thysanodes*)
Hatch's click beetle (*Eanus hatchi*)
Island large marble butterfly (*Euchloe ausonides insulanus*)
Larch Mountain salamander (*Plethodon larselli*)
Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Makah's copper butterfly (*Lycaena mariposa charlottensis*)
Margined sculpin (*Cottus marginatus*)
Newcomb's littorine snail (*Algamorda newcombiana*)
Northern goshawk (*Accipiter gentilis*)
Northern sea otter (*Enhydra lutris kenyoni*)
Northwestern pond turtle (*Emys* (= *Clemmys*) *marmorata marmorata*)
Olive-sided flycatcher (*Contopus cooperi*)
Olympic torrent salamander (*Rhyacotriton olympicus*)
Oregon vesper sparrow (*Pooecetes gramineus affinis)*
Pacific lamprey (*Lampetra tridentata)*
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii)*
Pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens)*
Peregrine falcon (*Falco peregrinus)*
River lamprey (*Lampetra ayresi)*
Small-footed myotis (*Myotis ciliolabrum)*
Slender-billed white-breasted nuthatch (*Sitta carolinensis aculeate)*
Tailed frog (*Ascaphus truei)*

Tufted puffin (*Fratercula cirrhata)*
Valley silverspot butterfly (*Speyeria zerene bremnerii)*
Van Dyke's salamander (*Plethodon vandykei)*
Western gray squirrel (*Sciurus griseus griseus)*
Westslope cutthroat trout (*Oncorhynchus (=Salmo) clarki lewisi)*
Western toad (*Bufo boreas)*

Species of Concern, Plants

Barrett's beardtongue (*Penstemon barrettiae*)
Clackamas corydalis (*Corydalis aquae-gelidae*)
Clustered lady's slipper (*Cypripedium fasciculatum*)
Columbia yellow-cress (*Rorippa columbiae*)
Cotton's milk-vetch (*Astragalus australis* var. *olympicus*)
Footsteps of spring; bear's foot sanicle (*Sanicula arctopoides*)
Frigid shootingstar (*Dodecatheon austrofrigidum*)
Gorge daisy (*Erigeron oreganus*)
Howell's daisy (*Erigeron howellii*)
Obscure paintbrush (*Castilleja cryptantha*)
Oregon sullivantia (*Sullivantia oregana*)
Pale blue-eyed grass (*Sisyrinchium sarmentosum*)
Pale larkspur (*Delphinium leucophaeum*)
Pink sandverbena *(Abronia umbellata* ssp. *Acutalata*)
Queen of the forest (*Filipendula occidentalis*)
Rose checker-mallow (*Sidalcea malviflora* ssp. *virgata*)
Seely's silene (*Silene seelyi*)
Stalked moonwort (*Botrychium pedunculosum*)
Tall bugbane (*Cimicifuga elata*)
Torrey's peavine (*Lathyrus torreyi*)
Triangular-lobed moonwort (*Botrychium ascendens*)
Whitebark Pine (*Pinus albicaulis*)
White meconella (*Meconella oregana*)
White-top aster (*Aster curtus*).

Candidate species are those species for which the U.S. Fish and Wildlife Service has sufficient information to propose for listing as threatened or endangered under the statute. Species of concern (some of which are former Category 1 and Category 2 candidates) are those species whose conservation status is of concern to the USFWS, but more information is needed.

ENDANGERED, THREATENED, PROPOSED, CANDIDATE, AND SPECIES OF CONCERN, AND DESIGNATED CRITICAL HABITAT IN THE UPPER COLUMBIA FISH AND WILDLIFE OFFICE AREA OR RESPONSIBILITY IN EASTERN WASHINGTON

(Revised – December 12, 2005)

Endangered

Gray wolf (*Canis lupus*)
Pygmy rabbit (*Brachylagus idahoensis*)- Columbia Basin DPS
Woodland caribou (*Rangifer tarandus caribou*)
Showy stickseed (*Hackelia venusta*), plant
Wenatchee Mountain checkermallow (*Sidalcea oregana* var. *calva*), plant

Threatened

Bald eagle (*Haliaeetus leucocephalus*)
Bull trout (*Salvelinus confluentus*) - Columbia River DPS
Canada lynx (*Lynx canadensis*)
Grizzly bear (*Ursus arctos = U.a. horribilis*)
Marbled murrelet (*Brachyramphus marmoratus marmoratus*)
Northern spotted owl (*Strix occidentalis caurina*)
Spalding's catchfly (*Silene spaldingii*), plant
Ute ladies'-tresses (*Spiranthes diluvialis*), plant
Water howellia (*Howellia aquatilis*), plant

Designated

Critical habitat for the Columbia River DPS of bull trout
Critical habitat for the northern spotted owl
Critical habitat for Wenatchee Mountain checkermallow (*Sidalcea oregana* var. *calva*)

Proposed

Critical habitat for the Canada lynx

Candidate Animals

Columbia spotted frog (*Rana luteiventris*) – Great Basin DPS (south of the Snake River)
Fisher (*Martes pennanti*) – West Coast DPS (west of the Okanagan River)
Greater sage grouse (*Centrocercus urophasianus*) – Columbia River DPS
Mardon skipper (butterfly) (*Polites mardon*)
Oregon spotted frog (*Rana pretiosa*)
Washington ground squirrel (*Spermophilus washingtoni*)
Yellow-billed cuckoo (*Coccyzus americanus*)

Candidate Plants

Basalt daisy (*Erigeron basalticus*)
Northern wormwood (*Artemisia campestris* var. *warmskioldii*)

Slender moonwort (*Botrychium lineare*)
Umtanum desert buckwheat (*Eriogonum codium*)
White Bluffs bladder-pod (*Lesquerella tuplashensis*)

Species of Concern

Animals

Black swift (*Cypseloides niger*)
Burrowing owl (*Athene cunicularia*)
California floater (mussel) (*Anodonta californiensis*)
Coastal cutthroat trout (*Oncorhynchus clarki clarki*)
Columbia clubtail (dragonfly) (*Gomphus lynnae*)
Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*)
Ferruginous hawk (*Buteo regalis*)
Fisher (*Martes pennanti*), east of the Okanagan River
Giant Columbia spire snail (*Fluminicola columbiana*)
Kincaid meadow vole (*Microtus pennsylvanicus kincaidi*)
Larch Mountain salamander (*Plethodon larselli*)
Loggerhead shrike (*Lanius ludovicianus*)
Long-eared myotis (bat) (*Myotis evotis*)
Margined sculpin (*Cottus marginatus*)
Northern goshawk (*Accipiter gentilis*)
Northern leopard frog (*Rana pipiens*)
Olive-sided flycatcher (*Contopus borealis*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus (=Plecotus) townsendii townsendii*)
Pallid Townsend's big-eared bat (*Corynorhinus (=Plecotus) townsendii pallescens*)
Peregrine falcon (*Falco peregrinus*) (Delisted, monitor status)
Preble's shrew (*Sorex preblei*)
Pygmy whitefish (*Prosopium coulteri*)
Redband trout (*Oncorhynchus mykiss*)
River lamprey (*Lampetra ayresi*)
Rocky Mountain tailed frog (*Ascaphus montanus*)
Sagebrush lizard (*Sceloporus graciosus*)
Sharptail snake (*Contia tenuis*)
Townsends ground squirrel (*Spermophilus townsendii*)
Western brook lamprey (*Lamptera richardsoni*)
Western gray squirrel (*Sciurus griseus griseus*)
Western pond turtle (*Clemmys marmorata*)
Westslope cutthroat trout (*Oncorhynchus clarki lewisi*)
Wolverine (*Gulo gulo luscus*)

Plants

Ames' milk-vetch (*Astragalus pulsiferae* var. *suksdorfii*)
Barrett's beardtongue (*Penstemon barrettiae*)

Blue Mountain onion (*Allium dictuon*)
Broad-fruit mariposa (*Calochortus nitidus*)
Chelan rockmat (*Petrophyton cinerascens*)
Clustered lady's-slipper (*Cypripedium fasciculatum*)
Columbia milk-vetch (*Astragalus columbianus*)
Crenulate moonwort (*Botrychium crenulatum*)
Gray cryptantha (*Cryptantha leucophaea*)
Hoover's desert-parsley (*Lomatium tuberosum*)
Hoover's tauschia (*Tauschia hooveri*)
Jessica's aster (*Aster jessicae*)
Least (dwarf) phacelia (*Phacelia minutissima*)
Liverwort monkey-flower (*Mimulus jungermannioides*)
Long-bearded sego lily (*Calochortus longebarbatus* var. *longebarbatus*)
Northwest raspberry (*Rubus nigerrimus*)
Obscure buttercup (*Ranunculus reconditus*)
Obscure Indian-paintbrush (*Castilleja cryptantha*)
Pale blue-eyed grass (*Sisyrinchium sarmentosum*)
Palouse goldenweed (*Haplopappus liatriformis*)
Persistent sepal yellowcress (*Rorippa columbiae*)
Prairie lupine (*Lupinus cusickii*)
Seely's silene (*Silene seelyi*)
Stalked moonwort (*Botrychium pedunculosum*)
Sticky phacelia (*Phacelia lenta*)
Suksdorf's desert-parsley (*Lomatium suksdorfii*)
Thistle milk-vetch (*Astragalus kentophyta*)
Thompson's clover (*Trifolium thompsonii*)
Triangular-lobed moonwort (*Botrychium ascendens*)
Two-spiked moonwort (*Botrychium paradoxum*)
Wanapum crazyweed (*Oxytropis campestris* var. *wanapum*)
Washington polemonium (*Polemonium pectinatum*)
Wenatchee larkspur (*Delphinium viridescens*)
White meconella (*Meconella oregana*)
Whitebark pine (*Pinus albicaulis*)
Whited's milk-vetch (*Astragalus sinuatus*)

Lichen

Woven spore lichen (*Texosporium sancti-jacobi*)

Mosses

Orthotrichum praemorsum

Candidate species are those species for which the U.S. Fish and Wildlife Service has sufficient information to propose for listing as threatened or endangered under the act. Species of concern (some of which are former Category 1 and Category 2 candidates) are those species whose conservation standing is of concern to the Service, but for which status information is still

needed. Conservation measures for species of concern and candidate species are voluntary but recommended. Protection provided to these species now may preclude possible listing in the future.

Table 20-1. Endangered, threatened, proposed, and candidate species found in Washington state under NOAA Fisheries jurisdiction.

SPECIES Common Name	Scientific Name	STATUS	ESU/RANGE/RUN/DPS
ANADROMOUS SALMONIDS			
Coho Salmon	*Oncorhynchus kisutch*	1) Threatened	1) Lower Columbia River
Chinook Salmon	*Oncorhynchus tshawytscha*	1) Endangered 2) Threatened 3) Threatened 4) Threatened 5) Threatened 6) Threatened	1) Upper Columbia River – spring run 2) Snake River – spring/summer run 3) Snake River – fall run 4) Lower Columbia River 5) Puget Sound 6) Upper Willamette River
Chum Salmon	*Oncorhynchus keta*	1) Threatened 2) Threatened	1) Hood Canal – summer run 2) Columbia River
Pink Salmon	*Oncorhynchus gorbuscha*	None	None
Sockeye Salmon	*Oncorhynchus nerka*	1) Endangered 2) Threatened	1) Snake River 2) Ozette Lake
Steelhead	*Oncorhynchus mykiss*	1) Endangered 2) Threatened 3) Threatened 4) Threatened 5) Threatened	1) Upper Columbia River 2) Snake River 3) Lower Columbia River 4) Middle Columbia River 5) Upper Willamette River
MARINE MAMMALS			
Humpback Whale	*Megaptera novaeangeliae*	Endangered	Range-wide, may be found off WA coast and in Puget Sound
Blue Whale	*Balaenoptera musculus*	Endangered	Range-wide, may be found off WA coast
Fin Whale	*Balaenoptera physalus*	Endangered	Range-wide, may be found off WA coast
Sei Whale	*Balaenoptera boreali*	Endangered	Range-wide, may be found off WA coast
Sperm Whale	*Physeter macrocephalus*	Endangered	Range-wide, may be found off WA coast
Killer Whale	*Orcinus orca*	Endangered	Southern Resident DPS, may be found seasonally in Puget Sound, the Strait of Juan de Fuca, and the southern Strait of Georgia
Steller Sea Lion	*Eumetopias jubatus*	Threatened	Western population, may be found off WA coast and in Puget Sound

Table 20-1 (continued). Endangered, threatened, proposed, and candidate species found in Washington state under NOAA Fisheries jurisdiction.

SPECIES Common Name	Scientific Name	STATUS	ESU/RANGE/RUN/DPS
MARINE TURTLES			
Leatherback Sea Turtle*	*Dermochleys coriacea*	Endangered	Range-wide, may be found off WA coast and in Puget Sound
Loggerhead Sea Turtle*	*Caretta caretta*	Threatened	Range-wide, may be found off WA coast
Green Sea Turtle*	*Chelonia mydas*	Endangered	Range-wide, may be found off WA coast
Olive Ridley Sea Turtle*	*Lepidochelys olivacea*	Endangered	Range-wide, may be found off WA coast

* Sightings and strandings of these animals are very rare, and there are no breeding beaches in NOAA's Northwest Region.

Left intentionally blank for future updates.

20.2 Working with Listed Salmonids—Considerations and Resources

Table 20-2. Endangered Species Act status listings: Washington state anadromous salmonids, January 2006.

Species	(E=endangered, T=threatened, Date is for FR publication)			Current Status Information and Critical Habitat Description
	Listed	Proposed	Candidate	
Coho (*Oncorhynchus kisutch*)	1) Lower Columbia R. (T - 6/05)			1) Threatened. Critical Habitat not yet proposed for designation.
Steelhead (*O. mykiss*)	1) Upper Col. R. (E - 8/97, T-1/06) 2) Snake R. (T - 8/97, 1/06) 3) Lower Col. R. (T - 3/98, 1/06) 4) Middle Col. R. (T - 3/99, 1/06)			1) Threatened. Critical Habitat Designated September 2, 05. 2) Threatened. Critical Habitat Designated September 2, 05. 3) Threatened. Critical Habitat Designated September 2, 05. 4) Threatened. Critical Habitat Designated September 2, 05.
Chum (*O. keta*)	1) Hood Canal Summer (T - 3/99, 6/05) 2) Columbia River (T-3/99, 6/05)			1) Threatened. Critical Habitat Designated September 2, 05. 2) Threatened. Critical Habitat Designated September 2, 05.
Chinook (*O. tshawytscha*)	1) Snake R. fall (T – 4/92, 6/05) 2) Snake R. spg/smmr (T – 4/92, 6/05) 3) Upper Col. R. Spring (E – 3/99, 6/05) 4) Puget Sound (T – 3/99, 6/05) 5) Lower Col. R. (T- 3/99, 6/05)			1) Threatened. Critical Habitat designated December 28, 1993. 2) Threatened. Critical Habitat Designated December 28, 1993 and revised October 25, 1999. 3) Endangered. Critical Habitat Designated September 2, 05. 4) Threatened. Critical Habitat Designated September 2, 05. 5) Threatened. Critical Habitat Designated September 2, 05.
Sockeye (*O. nerka*)	1) Snake R. (E - 11/91, 6/05) 2) Ozette Lake (T - 3/99, 6/05)			1) Endangered. Critical Habitat Designated December 28, 1993. 2) Threatened. Critical Habitat Designated September 2, 2005.

Table 20-3. Generalized life history patterns of salmon, steelhead, and trout in the Pacific Northwest. [a]

	Adult Return	Spawning Location	Eggs in Gravel [b]	Young in Stream	Freshwater Habitat	Young Migrate Downstream	Time in Estuary	Time in Ocean	Adult Weight (Avg.)
COHO	Oct-Jan	Coastal streams, shallow tributaries	Oct-May	1+ yrs.	Tributaries, mainstem, slack water	Mar-Jul (2nd yr.)	Few days	2 yrs.	5-20 lbs. (8)
CHUM	Sep-Jan	Coastal rivers and streams lower reaches	Sep-Mar	Days-weeks	Little time in freshwater	Shortly after leaving gravel	4-14 days	2.5-3 yrs.	8-12 lbs. (10)
CHINOOK		Main stem of large and small rivers			Mainstem large and small rivers		Days-months	2-5 yrs.	
Spring	Jan-Jul		Jul-Jan	1+ yrs.		Mar-Jul (2nd yr.)			10-20 lbs. (15)
Summer	Jun-Aug		Sep-Nov	1+yrs.		Spring (2nd yr.)			10-30 lbs. (14)
Fall	Aug-Mar		Sep-Mar	3-7 months		Apr-Jun (2nd yr.)			10-40 lbs.
PINK	Jul-Oct	Main stem of large and small streams, tributaries, lower reaches	Aug-Jan	Days-weeks	Little time in freshwater	Dec-May	Few days	1.5 yrs.	3-10 lbs. (4)
SOCKEYE	Jul-Aug	Streams, usually near lakes	Aug-Apr	1-3 yrs.	Lakes	Apr-Jun (2nd-4th yr.)	Few days	1-4 yrs.	3-8 lbs. (6)
STEELHEAD [c]		Tributaries, streams, and rivers			Tributaries		Less than 1 month	1-4 yrs.	
Winter	Nov-Jun	Nov-Jun	Feb-Jul	1-3 yrs.		Mar-Jun (2nd-5th yr.)			5-28 lbs. (8)
Spring	Feb-Jun	Feb-Jun	Dec-May	1-2 yrs.		Spr & Sum (3rd-4th yr.)			5-20 lbs.
Summer (Col. R)	Jun-Oct	Jun-Oct	Feb-Jun	1-3 yrs.		Mar-Jun (of 3rd-5th yr.)			5-30 lbs. (8)
Summer (coastal)	Apr-Nov	Apr-Nov	Feb-Jul	1-2 yrs.		Mar-Jun (of 2nd-5th yr.)			5-30 lbs. (8)

[a] There is much variation in life history patterns – each stream system having fish with their own unique timing and patterns of spawning, growth, and migration. Ask a local biologist about the specific patterns of the fish in your streams and update this chart for your area.
[b] The eggs of most salmonids take 3-5 months to hatch at the preferred water temperature of 50-55 degrees F; steelhead eggs can hatch in 2 months.
[c] Steelhead, unlike salmon, may not die after spawning. They can migrate back out to sea and return in later years to spawn again.
Adapted by Pacific States Marine Fisheries Commission. Sources: Ocean Ecology of North Pacific Salmonids, Bill Pearcy, University of Washington Press, 1992 Fisheries Handbook of Engineering Requirements and Biological Criteria, Milo Bell, U.S. Army Corps of Engineers, 1986; Adopting A Stream; A Northwest Handbook, Steve Yates, Adopt-A Stream Foundation, 1988.

Left intentionally blank for future updates.

20.3 Online Resources for Species Information

Joint Natural Resources Cabinet – Statewide Strategy to Recover Salmon
<http://www.governor.wa.gov/gsro/publications/strategy/summary.htm>

Alaska Department of Fish and Game
<http://www.state.ak.us/local/akpages/FISH.GAME/adfghome.htm>

American Fisheries Society
<http://www.fisheries.org/>

Canada Department of Fisheries and Oceans
<http://www.dfo-mpo.gc.ca/index.htm>

Columbia River Websites
<http://www.cqs.washington.edu/webgrp.html>

National Oceanic and Atmospheric Administration, Fisheries Service–Northwest Region
<http://www.nwr.noaa.gov/>

National Oceanic and Atmospheric Administration, Fisheries Service–Northwest Fisheries Science Center
<http://www.nwfsc.noaa.gov/>

Northwest Indian Fisheries Commission
<http://nwifc.wa.gov/>

Oregon Department of Fish and Wildlife
<http://www.dfw.state.or.us/>

Salmon Recovery Planning
<http://www.nwr.noaa.gov/Salmon-Recovery-Planning/ESA-Recovery-Plans/Draft-Plans.cfm>

Governor's Office–Salmon Recovery home page
<http://www.governor.wa.gov/gsro/>

U.S. Fish and Wildlife Service–home page
<http://www.fws.gov/>

U.S. Fish and Wildlife Service and NOAA Fisheries Section 7 Consultation Handbook
<http://endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm>

U.S. Army Corps of Engineers–Northwest Division
<http://www.nwd.usace.army.mil/>

Washington Department of Ecology
<http://www.ecy.wa.gov/>

Washington Department of Fish and Wildlife, Priority Habitats and Species
<http://wdfw.wa.gov/hab/phspage.htm>

Streamnet – The northwest aquatic information network
<http://www.streamnet.org/>

Washington Department of Natural Resources, Natural Heritage Program homepage
<http://www.dnr.wa.gov/nhp/>

WSDOT Highways and Local Programs
<http://www.wsdot.wa.gov/TA/HOMEPAGE/HLPHP.html>

National Oceanic and Atmospheric Administration, Fisheries Service– Office of Sustainable Fisheries
<http://www.nmfs.noaa.gov/sfa/index.htm#achieve>

Pacific Fishery Management Council–EFH, Appendix A of Amendment 14
<http://www.psmfc.org/efh/salmon_efh.html>

What Constitutes *Harm* to Endangered and Threatened Wildlife and Plants Under the ESA?

From NOAA Fisheries, NOAA, and Dept. of Commerce,
A final rule in the Federal Register, 8 November 1999

Summary:

This final rule defines the term "harm", which is contained in the definition of *take* in the Endangered Species Act. The purpose of this rulemaking is to clarify the type of harm that may result in a *take* of a listed species under the ESA. This is not a change is existing law. It provides clear notification to the public that habitat modification or degradation may harm listed species and, therefore, constitutes a *take* under the ESA as well as ensuring consistency between NOAA Fisheries and USFWS. This rule defines the term "harm" to include any act, which actually kills or injures fish or wildlife. Such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns of fish or wildlife.

Activities That May Constitute a *take*:

A principle purpose of this final rule is to provide clear notification to parties that habitat modification or degradation may harm listed species and, therefore, constitute a *take* under the ESA. The following list identifies several examples of habitat-modifying activities that may fall within the scope of this final rule when these or similar activities cause death or injury to fish or wildlife, including those activities that significantly impair essential behavioral patterns of listed species. In all instances a causal link must be established between the habitat modification and the injury or death of listed species. This list is not exhaustive:

- Constructing or maintaining barriers that eliminate or impede a listed species' access to habitat or ability to migrate.
- Discharging pollutants, oil, toxic chemicals, radioactivity, carcinogens, mutagens, teratogen, or organic nutrient-laden water including sewage water into a listed species' habitat.
- Removing, poisoning, or contaminating plants, fish, wildlife, or other biota required by the listed species for feeding, sheltering, or other essential behavioral patterns.
- Removing or altering rocks, soil, gravel, vegetation, or other physical structures that are essential to the integrity and function of a listed species' habitat.
- Removing water or otherwise altering streamflow when it significantly impairs spawning, migration, feeding, or other essential behavioral patterns.
- Releasing non-indigenous or artificially propagated species into a listed species' habitat or where they may access the habitat of a listed species.
- Constructing or operating dams or water diversion structures with inadequate fish screens or fish passage facilities at dams or water diversion structures in a listed species' habitat.
- Constructing, maintaining, or using inadequate bridges, roads, or trails on stream banks or unstable hill slopes adjacent or above a listed species' habitat.
- Conducting timber harvest, grazing, mining, earth moving or other operations, which result in substantially increased sediment input into streams.
- Conducting land-use activities in riparian areas and areas susceptible to mass wasting and surface erosion, which may disturb soil and increase sediment delivered to streams, such as logging, grazing, farming, and road construction.

Considerations for Projects That May Have Fisheries Impacts

- Projects that have *no effect* or are *not likely to adversely affect* listed, proposed, or candidate species go through the agency review process much faster and smoother than projects that will result in an adverse effect. Projects that restrict in-water work within the appropriate work window will minimize impacts on fish species, and will be more likely to have a "not likely to adversely affect" call. Work in systems that have listed resident fish species such as bull trout or steelhead may not have an impact-free window.
- Minimize the impacts from the project by obtaining a hydraulic project approval (HPA) permit from the Washington Department of Fish and Wildlife (WDFW), and include the conditions of the HPA in the BA impact minimization measures.
- Projects requiring new culverts or other fish-friendly engineering should use WDFW guidelines. WDFW Habitat and Lands Program, Environmental Engineering Division is a good source for engineering information. *Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings* can be obtained on the WDFW website: <http://wdfw.wa.gov/hab/engineer/cm/>.
- Projects that include in-water work, such as slope stabilization in stream or river systems, should follow the *Integrated Streambank Protection Guidelines*, which is published by WDFW and can be obtained on the WDFW website: <http://wdfw.wa.gov/hab/ahg/strmbank.htm>.
- Projects that require the placement of riprap within the ordinary high water mark minimize impacts by covering an equal or larger area of riprap and restoring the stream channel in close proximity to the new riprap. Replacement of existing riprap with new riprap should include design criteria from the *Integrated Streambank Protection Guidelines* (WDFW).
- Stormwater impacts must be considered in the BA. Projects should follow the guidance of an approved stormwater manual. Items which require special consideration include treatment to remove contaminates and release rates. The stormwater guidance provided in the WSDOT Instructional Letter (Section 5.6) should be followed when possible.
- Best management practices (BMPs) for erosion and sedimentation control, spill cleanup plans, etc., for the project should come from a Department of Ecology approved plan for erosion control, spill prevention, stormwater, or the WSDOT *Highway Runoff Manual*. The need to follow these manuals can be listed as a recommendation in the BA. In many cases, these manuals are already being used.

Example:

> A temporary erosion and sedimentation control (TESC) plan in accordance with the WSDOT *Highway Runoff Manual* will be developed and implemented for all projects requiring grading, ditching, filling, embankment compaction, or excavation. The best management practices in the plan will be used to control sediments from all vegetation or ground disturbing activities.

20.4 Wildlife Sensitive Periods Calendar

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Bald Eagle Nesting	1B	B	B	B	B	B	B	B15				
Bald Eagle Wintering	W	W	W31							31W	W	W
Brown Pelican						S	S	S	S	S	S	
Gray Wolf Mating/Denning		B	B	B	B	B	B	B				
Gray Wolf Rendezvous							R	R	R	R	R	
Grizzly Bear Hibernation/Denning	H	H	H	H30							15H	H
Marbled Murrelet				1B	B	B	B	Early 5 Late 16	B15			
N. Spotted Owl Nesting			1B	B	B	B	Early 15 Late 16	B	B30			
Sea Turtles						S	S	S	S	S		
W. Snowy Plover Breeding				1B	B	B	B	B31				
W. Snowy Plover Migratory				15M	M15				15M	M15		

Breeding = B
Hibernating = H
Migrating = M
Rendezvous = R
Summer use = S
Wintering = W

20.5 Identification Window for Threatened and Endangered Plants in Washington

Dates provided are approximate and vary by locale.

Common Name	Scientific Name	Federal Status*	April	May	June	July	Aug	Sept	Oct
Basalt daisy	*Erigeron basalticus*	C		X	X	X	X	X	X
Bradshaw's desert parsley	*Lomatium bradshawii*	E	15 X	X 15					
Golden paintbrush	*Castilleja levisecta*	T	20X	X	X	X10			
Kincaid's lupine	*Lupinus sulphureus* var. *kincaidii*	T	X	X	X	X			
Marsh sandwort	*Arenaria paludicola*	E		X	X	X	X		
Nelson's checker mallow	*Sidalcea nelsoniana*	T		15 X	X	X	X		
Northern wormwood	*Artemesia campestris* ssp. *borealis* var. *wormskioldii*	C	X						
Slender moonwort	*Botrychium lineare*	C			X	X			
Spalding's catchfly	*Silene spaldingii*	T					X		
Showy stickseed	*Hackelia venusta*	E		X	X	X			
Umtanum desert buckwheat	*Eriogonum codium*	C		X	X	X	X		
Ute ladies' tresses	*Spiranthes diluvialis*	T				X	X	X	?
Water howellia	*Howellia aquatilis*	T		25 X	X	X			
Wenatchee Mountains checker-mallow	*Sidalcea oregana* var. *calva*	E			X	X			
White Bluffs bladder-pod	*Lesquerella tuplashensis*	C			X	X			

* Abbreviated as follows:
E Endangered
C Candidate species for listing
P Proposed species for listing
T Threatened

20.6 Recovery Plans

The following website is an invaluable resource for locating and downloading existing recovery plans: <http://endangered.fws.gov/recovery/>. The plans available at this online source (from the years 1978 through 2004) that are most applicable to projects located in Washington state are as follows:

- 07/22/04–U.S. Fish and Wildlife Service. 2004. Recovery Plan for Wenatchee Mountains Checker-mallow. Portland, Oregon. 64 pp.
- 07/01/04–U.S. Fish and Wildlife Service. 2004. Bull Trout: Coastal-Puget Sound DPS Draft Recovery Plan. Volume 1 - Puget Sound Management Unit. Portland, Oregon. 410 pp.
- 07/01/04–U.S. Fish and Wildlife Service. 2004. Bull Trout: Coastal-Puget Sound DPS Draft Recovery Plan. Volume 2- Olympic Peninsula Management Unit. Portland, Oregon. 297 pp.
- 08/22/01–Revision; U.S. Fish and Wildlife Service. 2001. Oregon Silverspot Butterfly Revised Recovery Plan. Portland, Oregon. 121 pp.
- 08/23/00–U.S. Fish and Wildlife Service. 2000. Recovery Plan for the Golden Paintbrush (*Castilleja levisecta*). U.S. Fish and Wildlife Service, Portland, Oregon. 51 pp.
- 12/01/98–Revision; National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Olive Ridley Turtle (*Lepidochelys olivacea*). National Marine Fisheries Service, Silver Spring, Maryland.
- 12/01/98–Revision; National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Loggerhead Turtle (*Caretta caretta*). National Marine Fisheries Service, Silver Spring, Maryland.
- 12/01/98–Revision; National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*).
- 12/01/98–Revision; National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1998. Recovery Plan for U.S. Pacific Populations of the Green Turtle (*Chelonia mydas*).

- 09/30/98–Final; U.S. Fish and Wildlife Service. 1998. Recovery Plan for the Threatened Nelson's Checker-mallow (*Sidalcea nelsoniana*). Portland, Oregon. 61 pp.
- 09/28/98–Final; U.S. Fish and Wildlife Service. 1998. Recovery Plan for Marsh Sandwort (*Arenaria paludicola*) and Gambel's Watercress (*Rorippa gambelii*). U.S. Fish and Wildlife Service, Portland, Oregon. 50 pp. +appendices.
- 09/24/97–Final; U.S. Fish and Wildlife Service. 1997. Recovery Plan for the Threatened Marbled Murrelet (*Brachyramphus marmoratus*) in Washington, Oregon, and California. Portland, Oregon. 203 pp.
- 03/04/94–Revision; U.S. Fish and Wildlife Service. 1994. Recovery Plan for Woodland Caribou in the Selkirk Mountains. Portland, Oregon. 79 pp.
- 09/10/93–Revision; U.S. Fish and Wildlife Service. 1993. Grizzly Bear Recovery Plan. Missoula, Montana. 181 pp.
- 08/13/93–U.S. Fish and Wildlife Service. 1993. Bradshaw's Lomatium Recovery Plan. Portland, Oregon. 52 pp.
- 04/06/92–Final; U.S. National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1992. Recovery Plan for Leatherback Turtles in the U.S. Caribbean, Atlantic and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C. 65 pp.
- 12/26/91–Final; U.S. National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991. Recovery Plan for U.S. Population of Loggerhead Turtle. National Marine Fisheries Service, Washington, D.C. 64 pp.
- 08/03/87–U.S. Fish and Wildlife Service. 1987. Northern Rocky Mountain Wolf Recovery Plan. Denver, CO. 146 pp.
- 06/14/83–Revision; U.S. Fish and Wildlife Service. 1983. Columbia White-tailed Deer Recovery Plan. Portland, Oregon. 86 pp.

As referenced above, several of the recovery plans were jointly written by the USFWS and NOAA Fisheries. Some recovery plans are available only online, on the NOAA Fisheries website at <http://www.nmfs.noaa.gov/prot_res/PR3/recovery.html>.

The plans available on this website that are most applicable to projects occurring in Washington state are as follows:

- Final Recovery Plan for the Humpback Whale, November 1991
- Final Recovery Plan for the Steller Sea Lion, December 1992.

Some of the listed species under the jurisdiction of USFWS in Washington state have completed recovery plans that are not available online, including the following:

- Bald Eagle (Northern States) Recovery Plan dated 7/29/83
- Brown Pelican (CA, OR, WA Populations) dated 2/3/83.

The remaining listed species do not have completed recovery plans that are available for research purposes.

21.0 References

21.0 References

The reference lists provided here are divided into two major categories:

- References cited in the text, tables, and graphics of this manual
- Standard references commonly used in preparation of biological assessments.

21.1 References Cited in This Manual

71 FR 3260. Small Takes of Marine Mammals Incidental to Specified Activities; Marine Geophysical Survey in the Eastern Tropical Pacific. V71, #13:3260-3275.

Anderson, James J. 1992. Assessment of the Risk of Pile Driving to Juvenile Fish. Presentation to the Deep Foundations Institute, October 10–12, 1992, Seattle, Washington.

Bain, D.E. 2002. A model linking energetic effects of whale watching to killer whale (*Orcinus orca*) population dynamics. Friday Harbor Laboratories, University of Washington, Friday Harbor, Washington.

Bain, D.E. and M.E. Dahlheim. 1994. Effects of masking noise on detection thresholds of killer whales. In T.R. Loughlin (ed.), *Marine Mammals and The Exxon Valdez*. Academic Press, New York. Pp 243-256.

Bolt, Beranek, and Newman. 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C. Region 1, Seattle, Washington. (See WSDOT 1991.)

Bolt, Beranek, and Newman. 1987. Noise Control for Buildings and Manufacturing Plants. U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C.

Bottorf, J. and J. Schafer. 1987. Orcas Island Ferry Terminal Noise Study, San Juan County, Washington. Washington State Department of Transportation, Environmental Unit, Olympia, Washington.

Buck, E.H. 1995. Acoustic Thermometry of Ocean Climate: Marine Mammal Issues. CRS Report 95-603 ENR.

Burgess, W.C. and S.B. Blackwell. 2003. Acoustic Monitoring of Barrier Wall Installation at the Former Rhône-Poulenc Site, Tukwila, Washington. Greeneridge Sciences, Inc., Report 290-1.

CalTrans. 2003. Personal communication.

Carlson, Tom. 2003. Personal communication.

Cavanaugh, W. J. and G.C. Tocci. 1998. Environmental Noise. Published in E.S.C., USC Journal of Public Affairs, Vol.1 Num. 1., Los Angeles, CA.

Chapman, C.J. and A.D. Hawkins. 1973. A Field Study of Hearing in the Cod, *Gadus morhua*. J. Comp. Physiol. 85:147–67.

Clean Water Act section 303(d) lists provided by the Department of Ecology for threatened waters in the state of Washington, available online at <http://www.ecy.wa.gov/programs/wq/303d/index.html>.

Delaney, D.K. and T.G. Grubb. 2004. Sound Recordings of Road Maintenance Equipment on the Lincoln National Forest, New Mexico. Res. Pap. RMRS-RP-49. Fort Collins, CO: USDA Forest Service, Rocky Mountain Research Station. 56 p.

Delaney, D.K., and T.G. Grubb. 2003. Effects of Off-Highway Vehicles on Northern Spotted Owls: 2002 Results. A report to the State of California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division, Contract No. 4391Z9-0-0055.

DesJardin. 2003. Personal communication.

Dooling, R.J. and S.H. Hulse. 1989. The Comparative Psychology of Audition: Perceiving Complex Sounds. Lawrence Erlbaum Assoc., Hillsdale, New Jersey (cited in USDI 2003).

Ecology. 2001. Stormwater Management Manual for Western Washington. Washington Department of Ecology.

Ecology. 2004. Stormwater Management Manual for Eastern Washington. Washington Department of Ecology.

Enger, P.S. 1981. Frequency Discrimination in Teleosts—Central or Peripheral? Pp. 243–255 *in*: W.N. Tavolga, A.N. Popper, and R.R. Fay [ed.], Hearing and Sound Communication in Fishes. Springer Verlag, New York.

Feist, Blake E., J.J. Anderson, and R. Myaamoto. 1992. Potential Impacts of Pile Driving on Juvenile Pink (*Oncorhynchus borbuscha*) and Chum (*O. keta*) Salmon Behavior and Distribution. FRI-UW-9603. University of Washington, School of Fisheries, Fisheries Research Institute.

Govoni, J.J., L.R. Settle, and M.A. West. 2003. Trauma to Juvenile Pinfish and Spot Inflicted by Submarine Detonations. J. Aquatic Anim. Health 15:111–119.

Gyselman, E. and J. Jorgenson. (unpublished). Acoustic Measurement of the Behavioral Response of Arctic Riverine Fish to Seismic Sound. Presentation given at the 2005 Acoustical Society of America meeting in Vancouver, B.C.

Harris, C.M. 1991. Handbook of Acoustical Measurement and Noise Control.

Hastings, M.C. 1995. Physical Effects of Noise on Fishes. Proceedings of INTER-NOISE 95, The 1995 International Congress on Noise Control Engineering. Volume II, 979–984.

Hastings, M.C. 2002. Clarification of the Meaning of Sound Pressure Levels and the Known Effects of Sound on Fish. White Paper. August 2002.

Hastings, M.C., A.N. Popper, J.J. Finneran, and P. Lanford. 1996. Effects of Low Frequency Sound on Hair Cells of the Inner Ear and Lateral Line of the Teleost Fish *Astronotus ocellatus*. Journal of the Acoustical Society of America 99(3):1759–1766.

Hastings, MC. and A.N. Popper. 2005. Effects of Sound on Fish. White Paper. January 2005.

Hawkins, A.D. and A.D.F. Johnstone. 1978. The Hearing of Atlantic Salmon, *Salmo salar*. J. Fish. Biol. 13:655–673.

Heathershaw, A.D., P.D. Ward, and A.M. David. 2001. The Environmental Impact of Underwater Sound. Proc. I.O.A. Vol. 23(4):1–13.

Hult, R. 1982. Another Function of Echolocation for Bottlenose Dolphins (*Tursiops truncatus*). Cetology 47:1–7.

Illingworth and Rodkin, Inc. 2001. Noise and Vibration Measurements Associated with the Pile Installation Demonstration Project for the San Francisco-Oakland Bay Bridge East Span, Final Data Report, Task Order 2, Contract No. 43A0063.

Illingworth and Rodkin. 2004. Personal communication.

Jepson, P.D., M. Arbelo, R. Deaville, I.A.P. Patterson, P. Castro, J.R. Baker, E. Degollada, H.M. Ross, P. Heeaez, A.M. Pocknell, F. Rodriguez, F.E. Howie, A. Espinosa, R.J. Reid, J.R. Jaber, V. Martin, A.A. Cunningham, and A. Fernandez. 2003. Gas-bubble lesions in stranded cetaceans. Nature 425:575-576.

Longmuir, C. and T. Lively. 2001. Bubble Curtain Systems for Use During Marine Pile Driving. Produced by Fraser River Pile & Dredge, Ltd.

LSA Associates. 2002. Noise. Livermore General Plan Update, Working Paper. Berkeley, California.

McCauley, R.D., J. Fewtrell, and A.N. Popper. 2003. High Intensity Anthropogenic Sound Damages Fish Ears. Acoustical Society of America 113(1).

McKenzie. 2004. Personal communication.

National Marine Fisheries Service (NMFS). 2005. Proposed Conservation Plan for Southern Resident Killer Whales (*Orcinus orca*). National Marine Fisheries Service, Northwest Region, Seattle, Washington. 183 pp.

Nedwell, J., Turnpenny, A., Langworthy, J., and Edwards, B. 2003. Measurements of Underwater Noise during Piling at the Red Funnel Terminal, Southampton, and Observations of Its Effect on Caged Fish. Subacoustics LTD. Report 558 R 0207.

Nedwell, J.R., B. Edwards, A.W.H. Turnpenny, and J. Gordon. 2004. Fish and Marine Mammal Audiograms: A Summary of Available Information. Subacoustech Report Ref: 534R0214.

Nedwell, JR. and B. Edwards. 2002. Measurements of Underwater Noise in the Arun River during Piling at County Warf, Littlehampton. Subacoustech Report Reference: 513 R 0108.

NOAA Fisheries. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale.

NOAA Fisheries. 2003. Terms and Conditions of the Lower Columbia River Programmatic Consultation for Minor Discharges and Excavations. Found in Endangered Species Act Section 7 Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation: Revised Standard Local Operating Procedures for Endangered Species for Certain Regulatory and Operations Activities Carried Out by the Department of the Army in Oregon and the North Shore of the Columbia River. July 8, 2003.

Norris, K.S. and B. Møhl. 1983. Can Odontocetes Debilitate Prey with Sound. Am. Naturalist 122:85–104.

Pater, L. D., D.K. Delaney, T.J. Hayden, B. Lohr, and R. Dooling. 1999. Assessment of Training Noise Impacts on the Red-Cockaded Woodpecker: Preliminary Results. CERL Tech. Rept. 99/51. U.S. Army Corps of Engineers, Construction Engineering Research Laboratory, Champaign IL.

Popper, A.N. and N.L. Clarke. 1976. The Auditory System of the Goldfish (*Carassius auratus*): Effects of Intense Acoustic Stimulation. Comp. Biochem. Physiol. 53:11–18.

Popper, A.N. and R.R. Fay. 1973. Sound Detection and Processing by Teleost Fishes: Critical Review. Journal of the Acoustical Society of America 53(6):1515–1529.

Popper, A.N. and R.R. Fay. 1993. Sound Detection and Processing by Fish: A Critical Review and Major Research Questions. Brain Behavior and Evolution 41:14–39.

Popper, A.N., M.E. Smith, P.A. Cott, B.W. Hanna, A.O. MacGillivray, M.E. Austin, and D.A. Mann. 2005. Effects of Exposure to Seismic Airgun Use on Hearing of Three Fish Species. J. Acoust. Soc. Am. 117(6)3958–3971.

Reyff, J., P. Donavan, and C.R. Green Jr. 2002. Underwater Sound Levels Associated with Construction of the Benicia-Martinez Bridge. Produced by Illingworth and Rodkin, Inc.

Reyff, J., P. Donavan, and C.R. Greene Jr. 2003. Underwater Sound Levels Associated with Seismic Retrofit Construction of the Richmond-San Rafael Bridge. Produced by Illingworth & Rodkin, Inc., and Greeneridge Sciences under contract to the California Department of Transportation.

Scholik, A.R. and H.Y. Yan. 2001. Effects of Underwater Noise on Auditory Sensitivity of a Cyprinid Fish. Hear. Res. 152:17–24.

Smith, M.E., A.S. Kane, and A.N. Popper. 2004. Acoustical Stress and Hearing Sensitivity in Fishes: Does the Linear Threshold Shift Hypothesis Hold Water? J. Exp. Biol. 207:3591–3602.

Smith, M.E., A.S. Kane, and A.N. Popper. 2004a. Noise-Induced Stress Response and Hearing Loss in Goldfish (*Carassius auratus*). J. Exp. Biol. 207:427–435.

Stocker, Michael. 2002. Fish Mollusks and other Sea Animals, and the Impact of Anthropogenic Noise in the Marine Acoustical Environment. Michael Stocker Associates for Earth Island Institute.

Turnpenny, A.W.H., K.P. Thatcher, and J.R. Nedwell. 1994. The Effects on Fish and Other Marine Animals of High-Level Underwater Sound. Report FRR 127/94. Fawley Aquatic Research Laboratory, Ltd., United Kingdom.

U.S. COE. 2000 (revised May 2001). Phase I Programmatic Biological Evaluation for the State of Washington for Salmonid Species Listed or Proposed by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service under the Endangered Species Act. U.S. Army Corps of Engineers. Available online at <http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=Programmatics>.

U.S. COE. 2001 (revised in July 2002). Phase II Programmatic Biological Evaluation for Habitat Restoration/Rehabilitation Activities in the State of Washington for Species Listed or Proposed by National Marine Fisheries Service and U.S. Fish and Wildlife Service under the Endangered Species Act. U.S. Army Corps of Engineers. Available online at <http://www.nws.usace.army.mil/PublicMenu/Menu.cfm?sitename=REG&pagename=Programmatics>.

Urick, R.J. 1983. Principles of Underwater Sound. Ch. 7 *In*: The Noise Background of the Sea. Peninsula Publishing, Los Altos, California.

USDI. 2003 (revised September 2004). Biological Opinion and Letter of Concurrence for Effects to Bald Eagles, Marbled Murrelets, Northern Spotted Owls, Bull Trout, and Designated Critical Habitat for Marbled Murrelets and Northern Spotted Owls from the Olympic National Forest Program of Activities for August 5, 2003, to December 31, 2008. U.S. Department of Interior, Fish and Wildlife Service, Lacey, Washington.

USDOT. 1995. Highway Traffic Noise Analyses and Abatement: Policy and Guidance. U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch, Washington, D.C.

USFS. 1996. Explosives, Chainsaw, and Rock Drill Demonstration. U.S. Forest Service, Mt. Baker/Snoqualmie National Forest, North Bend, Washington. Unpublished Report by Charles Vandemoer.

USFWS et al. 1993 (updated in 1998). Biological Assessment Preparation and Review. Proceedings of a 1993 workshop sponsored by the U.S. Fish and Wildlife Service; Resources Northwest, Inc.; and the Wildlife Society, Washington chapter.

USFWS. 1998. A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale. U.S. Fish and Wildlife Service.

USFWS. 2003. Biological Opinion and Letter of Concurrence of Effects on Bald Eagles, Marbled Murrelets, Northern Spotted Owls, Bull Trout, and Designated Critical Habitat for Marbled Murrelets and Northern Spotted Owls from Olympic National Forest Program Activities for August 5, 2003 to December 31, 2008. Reference number 1-3-03-F-0833. U.S. Fish and Wildlife Service.

USFWS. 2004. Personal communication. U.S. Fish and Wildlife Service.

Vagle, S. 2003. On the Impact of Underwater Pile Driving Noise on Marine Life. Canada DFO, Institute of Ocean Sciences, Ocean Science and Productivity Division.

Visconty, S. 2000. Ambient Noise and the Potential impact of Pile Driving on Bald Eagle. Washington State Ferries.

Wallace, Richard. 2004. Personal communication (letter to Don Nelson, director of WSDOT environmental and engineering programs, regarding the WSDOT revised 2004 *Highway Runoff Manual*). Water Quality Program manager, Washington Department of Ecology. March 14, 2004.

Wardle, C.S., T.J. Carter, G.G. Urquhart, A.D.F. Johnstone, A.M. Ziolkowski, G. Hampson, and D. Mackie. 2001. Effects of Seismic Air Guns on Marine Fish. Continental Shelf Res. 21:1005–1027.

WCC. *Various dates*. Washington Conservation Commission 1999–2000 Limiting Factors Analysis reports for Washington state water resource inventory areas (WRIAs). Reports available online at <http://salmon.scc.wa.gov/contact/request.html>.

WDF. 1975. A Catalog of Washington Streams and Salmon Utilization, Volumes 1 (Puget Sound) and 2 (Coastal). Washington Department of Fisheries. November 1975.

WDFW 1992b. 1992 Washington State Salmon and Steelhead Stock Inventory (SASSI) – Appendices 1, 2, and 3. Washington Department of Fish and Wildlife and Western Washington Treaty Tribes. Available online at <http://wdfw.wa.gov/fish/sassi/sassi92.pdf>.

WDFW. 1992a. Fishway Design Guidelines for Washington State. Washington Department of Fish and Wildlife. Available online at <http://wdfw.wa.gov/hab/ahg/fishguid.pdf>.

WDFW. 1997. Aquatic Plants and Fish. APF-11-97. Washington Department of Fish and Wildlife. Available online at <http://wdfw.wa.gov/hab/aquaplnt/aquaplnt.pdf>.

WDFW. 1998. 1998 Washington State Salmon and Steelhead Stock Inventory (SASSI) – Bull Trout Appendix. Washington Department of Fish and Wildlife and Western Washington Treaty Tribes. Available online at <http://wdfw.wa.gov/fish/sassi/bulldolly.pdf>.

WDFW. 1999a. Fish Passage Design at Road Culverts: A Design Manual for Fish Passage at Road Crossings. Washington Department of Fish and Wildlife. Available online at <http://wdfw.wa.gov/hab/engineer/cm/>.

WDFW. 1999b (with 2005 addendum). Gold and Fish. Rules and regulations for mineral prospecting and placer mining. Washington Department of Fish and Wildlife. Available online at <http://www.wdfw.wa.gov/hab/goldfish/goldfish.htm>.

WDFW. 2000b. 2000 Washington State Salmon and Steelhead Stock Inventory (SASSI) – Coastal Cutthroat Trout Appendix. Washington Department of Fish and Wildlife and Western Washington Treaty Tribes. Available online at <http://wdfw.wa.gov/fish/sassi/cutthroat.pdf>.

WDFW. 2002. 2002 Salmonid Stock Inventory. Washington Department of Fish and Wildlife. Available online at agency interactive website: <http://wdfw.wa.gov/fish/sasi/>.

WDFW. 2002a. Integrated Streambank Protection Guidelines. Washington Department of Fish and Wildlife. Available online at <http://wdfw.wa.gov/hab/ahg/strmbank.htm>.

Western Highway Institute. 1971. Fundamentals of Noise and Vehicular Exterior Noise Levels. U.S. Department of Transportation, Federal Highway Administration, San Francisco, California.

WSDOT. 1991. Revised construction equipment noise ranges from Bolt et al. (1971). Washington State Department of Transportation.

WSDOT. 1994. Field Note Sound Level Measurements, Friday Harbor Ferry Terminal Wingwall Replacement. Washington State Department of Transportation, Environmental Office, Olympia Washington.

WSDOT. 1995. Field Note Sound Level Measurements, Bainbridge Island Ferry Terminal. Washington State Department of Transportation, Environmental Office, Olympia Washington.

WSDOT. 2001 (revised in 2003). Guidance for Preparing Biological Assessments: ESA, Indirect Effects, Transportation and Development. Washington State Department of Transportation.

WSDOT. 2002. No Effect and Not Likely to Adversely Affect Programmatic Biological Assessment Working Document for NOAA Fisheries Listed Species. Washington State Department of Transportation.

WSDOT. 2004a. Standard Specifications for Road, Bridge, and Municipal Construction. Washington State Department of Transportation.

WSDOT. 2004b. Programmatic Biological Assessment for the Washington State Department of Transportation Eastern Washington Regions – Working Document. Washington State Department of Transportation.

WSDOT. 2004d. Underwater Sound Levels Associated with Construction of the SR 240 Bridge on the Yakima River at Richland. Washington State Department of Transportation.

WSDOT. 2005 (revised). Highway Runoff Manual. Washington State Department of Transportation.

WSDOT. 2005b. Washington State Highway Log. Washington State Department of Transportation, Strategic Planning and Programming Division, Olympia Washington.

WSDOT. 2005c. Underwater Sound Levels Associated with the Friday Harbor Ferry Terminal. Washington State Department of Transportation, Office of Air, Noise, and Energy.

Wursig, B., C.R. Greene, Jr., and T.A. Jeffeson. 1999. Development of an Air Bubble Curtain to Reduce Underwater Noise of Percussive Piling. Marine Mammal Research 49 (2000):79–93.

21.2 Standard References Used in Preparation of Biological Assessments

The extensive reference list below is divided into the following categories:

- Biological assessments (general references)
  - Species and habitat management
    - Essential fish habitat

    - Limiting factors reports
- Amphibians and reptiles
- Birds
    - Bald eagle
    - Marbled murrelet
    - Marine birds
    - Northern goshawk
    - Owls
        - Spotted owl
    - Snowy plover
- Fishes
    - Bull trout
    - Chinook salmon
    - Chum salmon
    - Coastal cutthroat trout
    - West Coast sockeye salmon
    - West Coast steelhead
    - Westslope cutthroat trout
- Insects—Butterflies
- Mammals
    - Carnivores
    - Bats
    - Marine mammals
- Molluscs—Columbia pepplesnail
- Plants.

Biological Assessments (General References)

NOAA Fisheries. 1996. Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. National Marine Fisheries Service. August 1996.

U.S. COE. 2001. Working Document for Preparation of a Biological Evaluation or Biological Assessment. p. 5. U.S. Army Corps of Engineers. February 5, 2001.

USFWS, NOAA Fisheries. 1998. Final ESA Consultation Handbook: Procedures for Conducting Section 7 Consultations and Conferences. U.S. Fish and Wildlife Service and National Marine Fisheries Service, Washington, D.C. March 1998.

USFWS. 1999. Biological Assessment Preparation and Review. Updated March 1999. (Known also as the Peregrine Document.)

Species and Habitat Management

Brown, E.R. (technical editor). 1985. Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington. Part 1, Chapter Narratives. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 332p.

Brown, E.R. (technical editor). 1985. Management of Wildlife and Fish Habitats in Forests of Western Oregon and Washington. Part 2, Appendices. U.S. Department of Agriculture, Forest Service, Pacific Northwest Region. 332p.

Rodrick, E. and R. Milner (technical editors). 1991. Management Recommendations for Washington's Priority Habitats and Species. Washington Department of Wildlife, Olympia, Washington.

Essential Fish Habitat

Casillas, E., L. Crockett, Y. deReynier, J. Glock, M. Helvey, B. Meyer, C. Schmitt, M. Yoklavich, A. Bailey, B. Chao, B. Johnson and T. Pepperell. 1998. Essential Fish Habitat, West Coast Groundfish—Appendix. National Marine Fisheries Service. 778 pp.

PFMC. 1998a. The Coastal Pelagic Species Fishery Management Plan: Amendment 8. Pacific Fishery Management Council.

PFMC. 1998b. Final Environmental Assessment/Regulatory Review for Amendment 11 to the Pacific Coast Groundfish Fishery Management Plan. Pacific Fishery Management Council.

PFMC. 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts, and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council. August 1999.

Limiting Factors Reports

WSCC. Habitat Factors Limiting Salmon Success in Washington State. A series of reports that summarize limiting factors by WRIA. Available online at the Washington State Conservation Commission website: <http://salmon.scc.wa.gov/index.html>.

Amphibians and Reptiles

Blaustein, A.R., J.J. Beatty, D.H. Olson, and R.M. Storm. 1995. The Biology of Amphibians and Reptiles in Old-Growth Forests in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-337. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, Oregon. 98 pp.

Bowlby, C.E., G.A. Green, and M.L. Bonnell. 1994. Observations of Leatherback Turtles Offshore of Washington and Oregon. Northwestern Naturalist 75:33–35.

Corkran, C.C. and C. Thom. 1996. Amphibians of Oregon, Washington, and British Columbia. A Field Identification Guide. Lone Pine Publisher.

Herrington, R.E. 1988. Talus Use by Amphibians and Reptiles in the Pacific Northwest. Pages 216-221 in: Management of Amphibians, Reptiles and Small Mammals in North America. Gen. Tech. Rep. RM-166. Rocky Mt. Forest and Range Experiment Station.

Larsen, E.M. (editor). 1997. Management Recommendations for Washington's Priority Species, Volume III: Amphibians and Reptiles. Washington Department of Fish and Wildlife, Olympia, Washington. 122 pp.

Leonard, W.P., H.A. Brown, L.C. Jones, K.R. McAllister, and R.M. Storm. 1993. Amphibians of Washington and Oregon. Seattle Audubon Society, Seattle, Washington.

McAllister, K.R. and W.P. Leonard. 1997. Washington State Status Report for the Oregon Spotted Frog. Washington Department of Fish and Wildlife, Olympia, Washington. 38 pp.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1996. Recovery Plan for U.S. Pacific Populations of the Leatherback Turtle (*Dermochelys coriacea*). National Marine Fisheries Service, Silver Spring, Maryland.

Nussbaum, R.A., E.D. Brodie, and R.M. Storm. 1983. Amphibians and Reptiles of the Pacific Northwest. University Press of Idaho, Moscow, Idaho.

Olsen, D.E. (editor). 1996. Draft Survey Protocols for Component/Strategy 2 Amphibian Species. USDA Forest Service, Pacific Northwest Research Station. 72 pp.

WDF. 1993 (unpublished report). Status of the Larch Mountain Salamander (*Plethodon larselli*) in Washington. Washington Department of Wildlife, Olympia, Washington.

Birds

Bent, A.B. 1963. Life Histories of North American Flycatchers, Larks, Swallows, and Their Allies. Dover Publications, Inc., New York. 555 pp.

Bent, A.B. 1965. Life Histories of North American Wagtails, Shrikes, Vireos, and Their Allies. Dover Publications, Inc., New York. 411 pp.

Hays, D. 1997. Washington State Status Report for the Aleutian Canada Goose. Washington Department of Fish and Wildlife, Olympia, Washington. 18 pp.

Hunn, E.S. 1982. Birding in Seattle and King County. Seattle Audubon Society, Seattle, Washington. 160 pp.

Jaques, D.L., C.S. Strong, and T.W. Keeney. 1996. Brown Pelican Roosting Patterns and Responses to Disturbance at Mugu Lagoon and Other Non-Breeding Sites in the Southern California Bight. Technical Report No. 54. National Biological Service, CPSU/UA, Tucson, Arizona.

Larrison, E.J. and K.G. Sonnenberg. 1968. Washington Birds, Their Location and Identification. Seattle Audubon Society, Seattle, Washington. 258 pp.

Speich, S.M. and T.R. Wahl. 1989. Catalog of Washington Seabird Colonies. U.S. Fish and Wildlife Service. Biol. Rep. 88(6). 510 pp.

Bald Eagle

Anthony, R.G. and F.B. Isaacs. 1989. Characteristics of Bald Eagle Nest Sites in Oregon. J. Wild. Manage 53(1):148–159.

Anthony, R.G., R.W. Frenzel, F.B. Isaacs, and M.G. Garrett. 1994. Probable Causes of Nesting Failures in Oregon's Bald Eagle Population. Wildlife Soc. Bull. 22:576–582.

Grub, T.G. and R.M. King. 1991. Assessing Human Disturbance of Breeding Bald Eagles with Classification Tree Models. Journal of Wildlife Management 55:500–511.

Knight, R.L. 1984. Responses of Wintering Bald Eagles to Boating Activity. J. Wildl. Mange. 48(3):999–1002.

Russell, D. 1980. Occurrence and Human Disturbance Sensitivity of Wintering Bald Eagles on the Sauk and Suiattle Rivers, Washington. *In:* Proceedings of the Washington Bald Eagle Symposium. R.L. Knight, G.T. Allen, M.V. Stalmaster, and C.W. Servheen, editors.

Stalmaster, M.V. and G.R. Newman. 1978. Behavior Responses of Wintering Bald Eagles to Human Activity. J. Wildl. Mange. 42:506–513.

Stalmaster, M.V. and G.R. Newman. 1979. Perch-Site Preferences of Wintering Bald Eagles in Northwest Washington. J. Wildl. Mange. 43:221–224.

Stalmaster, M.V. and J.A. Gessaman. 1984. Ecological Energetic and Foraging Behavior of Overwintering Bald Eagles. Ecological Monographs 54:407–428.

Steenhoff, K. 1979. Management of Wintering Bald Eagles. USFWS. FWS/OBS-78-79.

Steidl, R.J. 1994. Human Impacts on the Ecology of Bald Eagles in Interior Alaska. Dissertation. Oregon State University, Corvallis, Oregon.

Steidl, R.J. and R.G. Anthony. 2000. Experimental Effect of Human Activity on Breeding Eagles. Ecological Application 10:258–268.

Stinson, D.W., J.W. Watson, and K.R. McAllister. 2001. Washington State Status Report for the Bald Eagle. Washington Department of Fish and Wildlife, Olympia, Washington. 92 pp.

USFWS. 1986. Recovery Plan for the Pacific Bald Eagle. U.S. Fish and Wildlife Service, Portland, Oregon. 160 pp.

Watson, J.W. and D.J. Pierce. 1998. Ecology of Bald Eagles in Western Washington with an Emphasis on Human Activity. Washington Department of Fish and Wildlife, Olympia, Washington.

Watson, J.W., D.J. Pierce, and B.C. Cunningham. 1999. An Active Bald Eagle Nest Associated with Unusually Close Human Activity. Northwestern Naturalist 80:71–74.

Marbled Murrelet

Brooks, A. 1928. Does the Marbled Murrelet Nest Inland? Murrelet 9:68. In: Ecology and Conservation of the Marbled Murrelet (1995). Edited by Ralph, C.J., Hunt, G.L. Jr., Raphael, M.G., and Piatt, J.F. Gen. Tech. Rep. PSW-GTR_152. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, California.

Carter, H.R. and S.G. Sealy. 1986. Year-Round Use of Coastal Lakes by Marbled Murrelets. Condor 88:473–477.

Cooper, B.A., D.M. Evans, and M.G. Raphael. 1998. Radar Studies of Marbled Murrelets in the Northeastern Olympic Peninsula, Washington. 58 pp.

DeSanto, T.L. and S.K. Nelson. 1995. Comparative Reproductive Ecology of the Auks (family Alcidae) with Emphasis on the Marbled Murrelet. In: Ecology and Conservation of the Marbled Murrelet. Edited by Ralph, C.J., Hunt, G.L. Jr., Raphael, M.G., and Piatt, J.F. Gen. Tech. Rep. PSW-GTR_152. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, California.

Hamer, T.E. and E.B. Cummins. 1991. Relationships between Forest Characteristics and Use of Inland Sites by Marbled Murrelets in Northern Washington. Washington Department of Wildlife, Nongame Program, Olympia, Washington. 47 pp.

Hamer, T.E., W.P. Ritchie, E.B. Cummins, and C.W. Turley. 1994 (unpublished report). Forest Habitat Relationships of Marbled Murrelets in Western Washington. Washington Department of Fish and Wildlife, Nongame Division, Olympia, Washington. 41 pp.

Leschner, L.L. and E.B. Cummins. 1992. Breeding Records, Inland Distribution, and Threats of the Marbled Murrelet in Washington from 1905 to 1987. *In:* H.R. Carter, and M.L. Morrison (eds.), Status and Conservation of the Marbled Murrelet in North America. Proceedings of the Western Foundation of Vertebrate Zoology 5(1):42–47.

Marshall, D.B. 1988. Status of the Marbled Murrelet in North America with Special Emphasis on Populations in California, Oregon, and Washington. Biology Report 88 (30). U.S. Fish and Wildlife Service. 19 pp.

Nelson, S.K. and R.W. Peck. 1995. Behaviour of Marbled Murrelets at Nine Nest Sites in Oregon. Northwestern Naturalists 76(1):43–53.

Nelson, S.K. and S.G. Sealy, editors. 1995. Biology of Marbled Murrelets: Inland and at Sea—A Symposium of the Pacific Seabird Group, 1993. Northwestern Naturalist. Volume 76, No. 1. 119 pp.

Nelson, S.K. and T.E. Hamer. 1995. Nest Success and the Effects of Predation on Marbled Murrelets. In: Ecology and Conservation of the Marbled Murrelet. Edited by Ralph, C.J., Hunt, G.L. Jr., Raphael, M.G., and Piatt, J.F. Gen. Tech. Rep. PSW-GTR_152. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, California.

Nelson, S.K. and T.E. Hamer. 1995. Nesting Biology and Behavior of the Marbled Murrelet. In: Ecology and Conservation of the Marbled Murrelet. Edited by Ralph, C.J., Hunt, G.L. Jr., Raphael, M.G., and Piatt, J.F. Gen. Tech. Rep. PSW-GTR_152. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, California.

Patton, P.W.C, C.J. Ralph, H.R. Carter, and S.K. Nelson. 1990. Surveying Marbled Murrelets at Inland Forested Sites: A Guide. Gen. Tech. Rep. PSW-120. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Berkeley, California. 9 pp.

Peterson, R.O. 1986. Gray Wolf. pp 950–967 in*:* Audubon Wildlife Report 1986. R.L. DiSilvestro, editor. National Audubon Society, New York.

Ralph, C.J., G.L. Hunt, Jr., M.G. Raphael, and J.F. Piatt (technical editors). 1995. Ecology and Conservation of the Marbled Murrelet. Gen. Tech. Rep. PSW-GTR_152. U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station, Albany, California. 420 pp.

Strong, C.S. 1995. Distribution of Marbled Murrelets along the Oregon Coast in 1992. pp 99–105 in: Biology of Marbled Murrelets: Inland and At Sea—A Symposium of the Pacific Seabird Group, 1993. Nelson, K.S. and S.G. Sealy, editors. Northwestern Naturalist. Volume 76 No. 1.

WDNR. 1996. Draft Habitat Conservation Plan. Chapter III B: pp. 23-46. Washington Department of Natural Resources, Olympia, Washington.

WDW. 1993 (unpublished report). Status of the Marbled Murrelet (*Brachyramphus marnoratus*) in Washington. Washington Department of Wildlife, Olympia, Washington. 25 pp.

Marine Birds

Angell, T. and K.C. Balcomb. 1984. Marine Birds and Mammals of Puget Sound. University of Washington Press, Seattle, Washington.

Brueggeman, J.J. (ed.). 1989. Information Synthesis and Hypothesis Formulation for Oregon and Washington Marine Mammal and Seabird Surveys. Final Report prepared by Envirosphere Company, Bellevue, WA, and Ecological Consulting, Inc., Portland, OR, for the Minerals Management Service, Pacific OCS Region. OCS Study MMS 89-0030. 374 pp.

Evans–Hamilton, Inc and D.R. Systems, Inc. 1987. Puget Sound Environmental Atlas. Prepared for U.S. Environmental Protection Agency, Puget Sound Water Quality Authority and the U.S. Army Corps of Engineers.

Jaques, D.L., and D.W. Anderson. 1988. Brown Pelican Use of the Moss Landing Wildlife Management Area: Roosting Behavior, Habitat Use, and Interactions with Humans. Unpublished report, California Department of Fish and Game, Sacramento, California.

Jaques, D.L. 1994. Range Expansion and Roosting Ecology of Non-Breeding California Brown Pelicans. Unpublished Masters Thesis, University of California, Davis, California.

Jaques, D.L., C.S. Strong, T.W. Keeney. 1996. Brown Pelican Roosting Patterns and Responses to Disturbance at Mugu Lagoon and Other Non-Breeding Sites in the Southern California Bight. National Biological Service Cooperative National Park Resources Studies Unit. Technical Report No. 54.

Northern Goshawk

Bull, E.L. and J.E. Hohmann. 1992. Northern Goshawks in Northeastern Oregon (Final Report). Unpublished report, Pacific Northwest Research Station, La Grande, Oregon. 34pp.

DeStefano, S. and E.C. Meslow. 1992. Annual Report: Status, Distribution, and Habitat of Northern Goshawks in Eastern Oregon. Unpublished report., Oregon Coop. Wildlife Research Unit, Corvallis, Oregon. 12pp.

Owls

Hayward, G.D. and J. Verner, tech. editors. 1994. Flammulated, Boreal, and Great Gray Owls in the United States: A Technical Conservation Assessment. Gen. Tech. Rep. RM-253. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 214. p.3: Maps.

Spotted Owl

Carey, A.B. 1985. A Summary of the Scientific Basis for Spotted Owl Management. Pages 100–114 *in* Gutierrez, R.J., and A.B. Carey, tech. editors. Ecology and Management of the Spotted Owl in the Pacific Northwest. U.S. Forest Service General Technical Report PNW-185.

Carey, A.B. 1993. Prey Ecology and Northern Spotted Owl Diet. Journal of Raptor Research 27:53-54.

Carey, A.B., S.P. Horton, and J.A. Reid. 1989. Optimal Sampling for Radiotelemetry Studies of Spotted Owl Habitat and Home Range. U.S. Forest Service Research Paper PNW-416.

Carey, A.B., S.P. Horton, and B.L. Biswell. 1992. Northern Spotted Owls: Influence of Prey Base and Landscape Character. Ecological Monographs 62:223-250.

Forsman, E.D. and E.C. Meslow, and H.M. Wight. 1984. Distribution and Biology of the Spotted Owl in Oregon. Wildlife Monographs 87:1-64.

Forsman, E.D. and E.C. Meslow. 1985. Old-Growth Forest Retention for Spotted Owls–How Much Do They Need? Pages 58-59 *in* Gutierrez, R.J., and A.B. Carey, tech. editors. Ecology and Management of the Spotted Owl in the Pacific Northwest. U.S. Forest Service General Technical Report PNW-185.

Forsman, E.D. and E.C. Meslow. 1986. Spotted Owl. *in* Audubon Wildlife Report 1986 (R.L. DiSilvestro, ed). National Audubon Society, New York. Pp 742-761.

Forsman, E.D., I. Otto, and A.B. Carey. 1991. Diets of Spotted Owls on the Olympic Peninsula, Washington and the Roseburg District, BLM. Page 527 *in* Ruggiero, L.R., K.B. Aubrey, A.B. Carey, and M.H. Huff, tech, coord. Wildlife and vegetation of unmanaged Douglas-fir forests. U.S. Forest Service General Technical Report PNW-285.

Gutierrez, R.J., and A.B. Carey, tech. editors. Ecology and Management of the Spotted Owl in the Pacific Northwest. U.S. Forest Service General Technical Report PNW-185.

Hanson, E.D. Hays, L. Hicks, L. Young, and J. Buchanon. 1993. Spotted Owl Habitat in Washington: A Report to the Washington State Forest Practices Board. Washington Department of Natural Resources, Olympia, Washington. 116 p.

Holthausen, R.S., M.G. Raphael, K.S. MeKelvey, E.D. Forsman, E.E. Starkey, and D.E. Seaman. 1995. The Contribution of Federal and Nonfederal Habitat to Persistence of the Northern Spotted Owl on the Olympic Peninsula, Washington: Report of the Reanalysis Team. U.S. Forest Service General Technical Report PNW-GTR-352. 68 p.

Mills, L.S., R.J. Frederickson, and B.B. Moorehead. 1993. Characteristics of Old-Growth Forests Associated with Northern Spotted Owls in Olympic National Park. J. Wildl. Mange. 57: 315-321.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. A Conservation Strategy for the Northern Spotted Owl. A report by the Interagency Scientific Committee to address the conservation of the northern spotted owl. U.S. Dept. of Agriculture, Forest Service, and U.S. Dept. of Interior, Fish and Wildlife Service, Bureau of Land Management, and National Park Service, Portland, Oregon.

USFWS. 1992. Recovery Plan for the Northern Spotted Owl–Draft. U.S. Fish and Wildlife Service, Portland Oregon.

WDNR. 1991. Owl Memo #3: Interim Policy and Procedures for Protection of the Northern Spotted Owl. Washington Department of Natural Resources. [*Check new WDNR rules on spotted owls.*]

WDNR. 1993. Spotted Owl Habitat in Washington: A Report to the Washington Forest Practices Board. Washington Department of Natural Resources, Spotted Owl Scientific Advisory Group, Olympia. 116 pp.

Snowy Plover

Federal Register. January 19, 1993. 12864 Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Pacific Coast Population of the Western Snowy Plover.

Federal Register. March 2, 1995. 11769. Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the Pacific Coast Population of the Western Snowy Plover.

WDFW. 1995. Washington State Recovery Plan for the Snowy Plover. Washington Department of Fish and Wildlife, Olympia, Washington. 87 pp.

Fishes

Behnke, R.J. 1992. Native Trout of Western North America. American Fisheries Society Monograph 6.

Emmett, R.L., S.L. Stone, S.A. Hinton, and M.E. Monaco. 1991. Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries, Volume II: Species Life History Summaries. ELMR Rep. No. 8. NOAA/NOS Strategic Environmental Assessments Division, Rockville, Maryland. 329p.

McClane, A.J. 1974. McClane's Field Guide to Freshwater Fishes of North America. Holt, Rinehart and Winston, New York.

Phinney, L.A., P. Bucknell, and R.W. Williams. 1975. A Catalog of Washington Steams and Salmon Utilization, Vol. 2, Coastal Region. Washington Department of Fisheries, Olympia, Washington.

Wydoski R.S. and R.R. Whitney. Inland Fishes of Washington. University of Washington Press, Seattle and London.

WDF et al. 1993. 1992 Washington State Salmon and Steelhead Stock Inventory. Washington Department of Fisheries, Washington Department of Wildlife, and Western Washington Treaty Indian Tribes, Olympia, Washington. March 1993.

Williams, R.W., R.M. Laramie, and J.J. Ames. 1975. A Catalog of Washington Streams and Salmon Utilization, Vol. 1, Puget Sound Region. Washington Department of Fisheries, Olympia, Washington.

Bull Trout

Barton, B.A. and W.P. Dwyer. 1997. Physiological Stress Effects of Continuous- and Pulsed-DC Electroshock on Juvenile Bull Trout. Journal of Fish Biology 51(5): 998-1008.

Batt, P.E. 1996. Bull Trout Conservation Plan. State of Idaho. Office of the Governor, Boise, Idaho.

Baxter, J.S. and J.D. McPhail. 1997. Diel Micro-Habitat Preferences of Juvenile Bull Trout in an Artificial Stream Channel. North American Journal of Fisheries Management 17: 975-980.

Baxter, J.S., E.B. Taylor, et al. 1997. Evidence for Natural Hybridization between Dolly Varden *(Salvelinus malma)* and Bull Trout *(Salvelinus confluentus)* in a North Central British Columbia Watershed. Canadian Journal of Fish and Aquatic Science 54: 421-429.

Beattie, W. and P. Clancey. 1988. Effect of the Operation of Kerr and Hungry Horse Dams on the Reproductive Success of Kokanee in the Flathead System. Montana Dept. of Fish, Wildlife and Parks, Kalispell, Montana.

Bellerud, B.L., S. Gunkel, et al. 1997. Bull Trout Life History, Genetics, Habitat Needs, and Limiting Factors in Central and Northeast Oregon. U.S. Department of Energy, Bonneville Power Administration, Portland, Oregon.

Boag, T.D. 1987. Food Habits of Bull Char, *Salvelinus confluentus,* and Rainbow Trout, *Salmo gairdneri,* Coexisting in a Foothills Stream in Northern Alberta. Canadian Field Naturalist 101(l): 56-62.

Bonar, S.A., M. Divens, et al. 1997. Methods for Sampling the Distribution and Abundance of Bull Trout/Dolly Varden. Washington Department of Fish and Wildlife, Inland Fisheries Investigations, Resources Assessment Division, Olympia, Washington.

Bond, C.E. 1992. Notes on the Nomenclature and Distribution of the Bull Trout and the Effects of Human Activity on the Species. Proceedings of the Gearhart Mtn. Bull Trout Workshop, Corvallis, Oregon Chapter of the American Fisheries Society.

Bonneau, J.L. and D.L. Scarnecchia. 1996. Distribution of Juvenile Bull Trout in a Thermal Gradient of a Plunge Pool in Granite Creek, Idaho. Transactions of the American Fisheries Society 125(4): 628-630.

Bonneau, J.L., R.F. Thurow, et al. 1995. Capture, Marking, and Enumeration of Juvenile Bull Trout and Cutthroat Trout in Small, Low-Conductivity Streams. North American Journal of Fisheries Management 15: 563-568.

Bonneville Power Administration. 1989. Assessment of the Fishery Improvement Opportunities on the Pend Oreille River, BPA, Portland, OR. Div. of Fish and Wildlife.

Brenkman, S.J. 1998. Factors Influencing Spawning Migration of Bull Trout *(Salvelinus confluentus)* in the North Fork Skokomish River, Olympic National Park, Washington. Oregon State University, Corvallis, Oregon. 92 p.

Brown, L. 1992. On the Zoogeography and Life History of Washington's Native Char; Dolly Varden *Salvelinus malma, (Walbaum)* and Bull Trout *Salvelinus confluentus,* (Suckley). Pages 34-75 in draft Bull Trout/ Dolly Varden Management and Recovery Plan. Washington Department of Wildlife Fisheries Management Division, Olympia, Washington.

Brown, T.G. 1992. Initial Survey: Stomach Contents of Potential Fish Predators of Juvenile Chinook Salmon *Oncorhynchus tshawytscha* in the Nechako River, B.C., Department of Fisheries and Oceans, Nanaimo (British Columbia). Pacific Biological Station.

Buckman, R.C., W.E. Hosford, et al. 1992. Malheur River Bull Trout Investigations. Proceedings of the Gearhart Mountain Bull Trout Workshop, Corvallis, Oregon Chapter of the American Fisheries Society.

Cavender, T.M. 1978. Taxonomy and Distribution of the Bull Trout, *Salvelinus confluentus* (Suckley) from the American Northwest. Calif. Fish and Game 3: 139-174.

Chisholm, I. and J. Fraley. 1986. Quantification of Libby Reservoir Levels Needed to Maintain or Enhance Reservoir Fisheries, Montana Dept. of Fish, Wildlife and Parks, Kalispell.

Craig, S.D. 1997. Habitat Conditions Affecting Bull Trout, *Salvelinus confluentus,* Spawning Areas within the Yakima River Basin, Washington. Central Washington University, Ellensburg, Washington. 74 p.

Cross, D. and L. Everest. 1994. Fish Habitat Attributes of Entered and Unentered Watersheds and the Distribution of Bull Char (*Salvelinus confluentus*) Spawning Sites in the Upper Spokane River Ecosystem, Northern Idaho. Coeur d'Alene, Idaho. 10 p. U.S. Forest Service. Idaho Panhandle National Forests.

Dambacher, J.M., M.W. Buktenica, et al. 1992. Distribution, Abundance, and Habitat Utilization of Bull Trout and Brook Trout in Sun Creek, Crater Lake National Park, Oregon. Proceedings of the Gearhart Mountain Bull Trout Workshop, Corvallis, Oregon. Chapter of the American Fisheries Society.

Donald, D.B. and D.J. Alger. 1993. Geographic Distribution, Species Displacement, and Niche Overlap for Lake Trout and Bull Trout in Mountain Lakes. Canadian Journal of Zoology, 71(2): 238-247.

DosSantos, J.M., J.E. Darling, et al. 1988. Lower Flathead System Fisheries Study: Main River and Tributaries, Volume 2. Bonneville Power Administration, Division of Fish and Wildlife, Portland, Oregon.

Elliot, S.T. 1986. Reduction of a Dolly Varden Population and Macrobenthos after Removal of Logging Debris. Trans. Am. Fish. Soc. 115:392-400.

Evarts, L., B. Hansen, et al. 1994. Hungry Horse Fisheries Mitigation Plan: Flathead Lake Angler Survey, Confederated Salish and Kootenai Tribes of the Flathead Reservation, Pablo, Montana.

Fickeisen, D.H. and D.R. Geist. 1994. Resident Fish Planning: Dworshak Reservoir, Lake Roosevelt and Lake Pend Oreille, Battelle Pacific Northwest Labs., Richland, Washington.

Fraley, J.J. and P.J. Graham. 1981. Physical Habitat, Geologic Bedrock Types and Trout Densities in Tributaries of the Flathead River Drainage, Montana. Acquisition and Utilization of Aquatic Habitat Inventory Information, Portland, Oregon, American Fisheries Society, Western Division.

Fraley, J.J. and B.B. Shepard. 1989. Life History, Ecology and Population Status of Migratory Bull Trout, *Salvelinus confluentus,* in the Flathead Lake and River System, Montana. Northwest Science 63(4): 133-143.

Fraley, J., D. Read, et al. 1981. Flathead River Fishery Study, Montana Dep. Fish, Wildlife and Parks, Helena. Fishery Div.

Fraley, J., B. Marotz, et al. 1989. Mitigation, Compensation, and Future Protection for Fish Populations Affected by Hydropower Development in the Upper Columbia System, Montana, U.S.A. Regulated Rivers Research and Management RRRMEP, Jan-Apr 3(1-4): 3-18.

Fritts, A. and D. Burgess. 1997. Bull Trout Observed in Lower Yakima River.

Goetz, F. 1989. Biology of the Bull trout, *Salvelinus confluentus,* A Literature Review. Eugene, Oregon. 53 p, Willamette National Forest.

Goetz, F. 1991. Bull Trout Life History and Habitat Study. Final Report USFS, Deschutes National Forest. Department of Fisheries and Wildlife. Oregon State University, Corvallis, Oregon.

Goetz, F.A. 1994. Distribution and Juvenile Ecology of Bull Trout (*Salvelinus confluentus*) in the Cascade Mountains. Oregon State University, Corvallis, Oregon. 173 p.

Gould, W.R. 1987. Features in the Early Development of Bull Trout (*Salvelinus confluentus*). Northwest Science 61(4): 264-268.

Graham, P.J., B.B. Shepard, et al. 1981. Use of Stream Habitat Classifications to Identify Bull Trout Spawning Areas in Streams. Acquisition and Utilization of Aquatic Habitat Inventory Information, Portland, Oregon, American Fisheries Society.

Graves, S., K.L. Lillengreen, et al. 1992. Fisheries Habitat Evaluation on Tributaries of the Coeur d'Alene Indian Reservation, Eastern Washington Univ., Cheney. Upper Columbia United Tribes Fisheries Center.

Haas, G.R. and J.D. McPhail. 1991. Systematics and Distributions of Dolly Varden (*Salvelinus malma*) and Bull Trout (*Salvelinus confluentus*) in North America. Canadian Journal of Fisheries and Aquatic Sciences 48(11):2191-2211.

Hann, D.R. 1993. Bull Char and Dolly Varden Radio Telemetry Study in the South Fork of the Skykomish River, WA. Draft. Skykomish Ranger District, P.O. Box 305, Skykomish, WA 98288.

Havis, R.N., C.V. Alonso, et al. 1993. A Mathematical Model of Salmonid Spawning Habitat. Water Resour. Bull 29(3): 435-444.

Hemmingsen, A.R., D.V. Buchanan, et al. 1996. Bull Trout Life History, Genetics, Habitat Needs, and Limiting Factors in Central and Northeastern Oregon. Portland, OR 97208-3 62 1, U.S. Dept. of Energy. Bonneville Power Administration. Environmental, Fish and Wildlife. P.O. Box 3621.

Hillman, T.W. and W.S. Platts. 1993. Survey Plan to Detect the Presence of Bull Trout. Don Chapman Consultants Inc., 3653 Richenbacker, Ste 200 Boise, ID 83705. Prepared for the Intermountain Forest Industry Association. N. 3731 Ramsey Road, Ste 110, Coeur d'Alene, Idaho 83814.

Houslet, B. and M. Riehle. 1995. Juvenile Bull Trout Abundance in Relation to Temperature. Handout from meeting: USDA Forest Service, Deschutes National Forest, Sisters Ranger District, Oregon.

Jakober, M.J., T.E. McMahon, et al. 1998. Role of Ice of Bull Trout. Transactions of the American Fisheries Society 127: 223-235.

James, B.B. 1997. The Feeding Ecology and Conservation of Juvenile Bull Trout, *Salvelinus confluentus,* in an Eastern Cascade Stream. Central Washington University, Ellensburg, Washington. 73 p.

Kitano, S., K. Maekawa, et al. 1994. Spawning Behavior of Bull Trout in the Upper Flathead Drainage, Montana, with Special Reference to Hybridization with Brook Trout. Transactions of the American Fisheries Society 123(6): 988-992.

Kondolf, G.M., G.F. Cada, et al. 1987. Assessing Flushing Flow Requirements for Brown Trout Spawning Gravels in Steep Streams. Water Resour. Bull 23(5): 927-936.

Leary, R.F., F.W. Allendorf, et al. 1983. Consistently High Meristic Counts in Natural Hybrids between Brook Trout and Bull Trout. Syst. Zool 32(4): 369-376.

Leary, R.F., F.W. Allendorf, et al. 1993. Conservation Genetics of Bull Trout in the Columbia and Klamath River Drainages. Conservation Biology 7(4): 856-865.

Leary, R.F. and F.W. Allendorf. 1997. Genetic Confirmation of Sympatric Bull Trout and Dolly Varden in Western Washington. Transactions of the American Fisheries Society 126: 715-720.

Leathe, S.E. 1980. Habitat Utilization by West Slope Cutthroat and Bull Trout in the Upper Flathead River Basin, Montana. Pages 324-333 in Western Proceedings, 60th annual conference of the Western Association of Fish and Wildlife Agencies.

Leathe, S.A. and P.J. Graham. 1981. Flathead Lake Fish Food Habits Study. Mont. Dept. of Fish and Parks.

Leathe, S.A. and P.J. Graham. 1983. Cumulative Effects of Micro-Hydro Development on the Fisheries of the Swan River Drainage, Montana, Montana Dept. of Fish, Wildlife and Parks, Kalispell. Fisheries Research and Special Projects Bureau.

Lillengreen, K.L., T. Skillingstad, et al. 1993. Fisheries Habitat Evaluation in Tributaries of the Coeur d'Alene Indian Reservation. Upper Columbia United Tribes Fisheries Center, Eastern Washington University, Cheney, Washington.

Maiolie, M.A. and S. Elam. 1993. Dworshak Dam Impacts Assessment and Fisheries Investigations. Idaho Dept. of Fish and Game, Boise, Idaho.

Mantech. 1996. An Ecosystem Approach to Salmonid Conservation. Spence, B.C., Lomnicky, G.A., Hughes, R.M., Novitzki, R.P. Management Technology, Mantech Environmental Technology Inc. <http://www.nwr.noaa.gov/Publications/Guidance-Documents/Habitat.cfm>.

Markle, D.F. 1992. Evidence of Bull Trout x Brook Trout Hybrids in Oregon. Proceedings of the Gearhart Mountain Bull Trout Workshop. Oregon Chapter of the American Fisheries Society.

Marotz, B. and J. Fraley. 1986. Instream Flows Needed for Successful Migration, Spawning, and Rearing of Rainbow and West Slope Cutthroat Trout in Selected Tributaries of the Kootenai River. Montana Dept. of Fish, Wildlife and Parks, Kalispell, Montana.

Maughan, E.0. 1976. A Survey of Fishes of the Clearwater River, ID. Northwest Science 50(2): 76-86.

May, B. and R.J. Zubik. 1985. Quantification of Hungry Horse Reservoir Water Levels Needed to Maintain or Enhance Reservoir Fisheries. Montana Dept. of Fish, Wildlife and Parks, Kalispell, Montana.

McLeod, C. and T. Clayton. 1993. Fish Radio Telemetry Demonstration Project, Upper Athabasca River, May to August, 1992. Northern River Basins Study, Project report No. 11. Edmonton, Canada.

McNeil, W.J. and P.A. Monk. 1997. A Literature Review of the Distribution and Abundance of Bull Trout, Report to the Yakima River Basin Coalition. October 10, 1997. 19 P.

McPhail, J.D. and J.S. Baxter. 1995. A Review of Bull Trout *(Salvelinus confluentus)* Life-History and Habitat Use in Relation to Compensation and Improvement Opportunities. Univ. of British Columbia, Dept. of Zoology, Vancouver, B.C.

Meehan, W.R. and T.C. Bjornn. 1991. Salmonid Distributions and Life Histories. American Fisheries Society Special Publication. 19: 47-82.

Mongillo, P.E. 1993. The Distribution and Status of Bull Trout/Dolly Varden in Washington State. Olympia, Washington. 45 p, Washington Department of Wildlife Fisheries Management Division.

Montana Bull Trout Scientific Group. 1996. Assessment of Methods for Removal or Suppression of Introduced Fish to Aid in Bull Trout Recovery. Helena, Montana, The Montana bull Trout Restoration Team. c/o Montana Fish, Wildlife & Parks 1420 E. 6th Ave.

Montana Bull Trout Scientific Group. 1996. The Role of Stocking in Bull Trout Recovery. Helena, Montana, The Montana Bull Trout Restoration Team. c/o Montana Fish, Wildlife & Parks 1420 E. 6th Ave.

Montana Fish Wildlife & Parks. 1995. Angler Fish Identification Surveys. Helena, Montana.

Moore, J.W. 1993. Oldman River Dam, Mercury in Fish. Alberta Environmental Centre, Vegreville, Canada.

Moring, J.R. 1993. Effect of Angling Effort on Catch Rate of Wild Salmonids in Streams Stocked with Catchable-Size Trout. North American Journal of Fisheries Management 13(2): 234-237.

Nakano, S., K.D. Fausch, et al. 1992. Resource Utilization by Bull Char and Cutthroat Trout in a Mountain Stream in Montana, U.S.A. Japanese Journal of Ichthyology 39(3): 211-216.

Nakano, S., S. Kitano, et al. 1998. Competitive Interactions for Foraging Microhabitat among Introduced Brook Char, *Salvelinus fontinalis,* and Native Bull Char, S. *confluentus,* and Westslope Cutthroat Trout, *Oncorhynchus clarki lewisi,* in a Montana Stream. Environmental Biology of Fishes 52: 345-355.

Nez Perce Dept. of Fisheries. 1989. Dworshak Reservoir Investigations: Trout, Bass and Forage Species. Resource Management, Orofino, ID. Orofino Project Office.

Ogg, L.W. 1998. Bull Trout Presence Report: Hood Canal Ranger District. December 10th. Olympic National Forest, Hoodsport, Washington.

Palmer, E. 1994. Against the Flow: Saving the Bull Trout. Canadian Geographic 114(5): 14.

Pearsons, T.N., G.A. McMichael, et al. 1996. Yakima River Species Interaction Studies. Annual Report 1994. Bonneville Power Administration, Portland, Oregon.

Phillips, R.B., S. A. Manley, et al. 1994. Systematics of the Salmonid Genus *Salvelinus* Inferred from Ribosomal DNA Sequences. Canadian Journal of Fisheries and Aquatic Sciences. 51(SUPPL. 1): 198-204.

Platts, W.S. and F.E. Partridge. 1983. Inventory of Salmon, Steelhead Trout, and Bull Trout: South Fork Salmon River, Idaho. Intermountain Forest and Range Experiment Station, Ogden, Utah.

Pleyte, K. A. 1991. A Phylogenetic Analysis of the Genus *Salvelinus* Using Ribosomal DNA Internal Transcribed Spacer (ITS) Sequences (Hucho Perry). University of Wisconsin at Milwaukee: 88.

Polacek, M.C. 1998. The Early Life History of Young-of-Year and Juvenile Bull Trout, *Salvelinus Confluentus*, in Indian Creek, Washington. Central Washington University, Ellensburg, Washington.

Pratt, K.L. 1984. Habitat Use and Species Interactions of Juvenile Cutthroat (*Salmo clarki lewisi*) and Bull Trout (*Salvelinus confluentus*) in the Upper Flathead River Basin. Fisheries Resources. Moscow, Idaho, Univ. of Idaho: 95.

Pratt, K.L. 1992. A Review of Bull Trout Life History. Proceedings of the Gearhart Mountain Bull Trout Workshop, Corvallis, Oregon. Chapter of the American Fisheries Society.

Proebstel, D.S. 1994. DNA Analysis of Bull Trout.

Pryne, E. 1993. Lawsuit Seeks Bull Trout's Listing as Endangered Species. Seattle Times, Seattle, Washington. B9.

Pryne, E. 1993. Seeking Time to Save Trout. Seattle Times, Seattle, Washington. B1 +132.

Pryne, E. 1994. Northwest Bull Trout Qualifies for Endangered-Species List, but Fine Print Keeps It Off. Seattle Times, Seattle, Washington. AI +A9.

Pyzik, R. and D. Bickford. 1997. Draft: Methods for Trapping Juvenile Bull Trout Using a Rotary Screw Trap. U.S. Forest Service, McKenzie Ranger District, Willamette National Forest, Oregon.

Ratliff, D. 1987. Bull Trout Spawning Report, Metolius River Tributaries. Portland General Electric. 7 p.

Ratliff, D.E. 1992. Bull Trout Investigations in the Metolius River-Lake Billy Chinook System. Proceedings of the Gearhart Mountain Bull Trout Workshop, Corvallis, Oregon. Chapter of the American Fisheries Society.

Ratliff, D.E. and P.J. Howell. 1992. The Status of Bull Trout Populations in Oregon. Proceedings of the Gearhart Mountain Bull Trout Workshop, Corvallis, Oregon. Chapter of the American Fisheries Society.

Read, D. 1980. Movement of Westslope Cutthroat and Bull Trout in the Upper Flathead River. Pages 315-323 in Western proceedings, 60th annual conference of the Western Association of Fish and Wildlife Agencies.

Richards, C. and P. Cernera. 1987. Salmon River Habitat Enhancement. Annual Report: FY 1986, Part 1, Bonneville Power Administration.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and Habitat Requirements for Conservation of Bull Trout. Ogden, Utah. 39 p. U.S. Forest Service,. Intermountain Research Station.

Rieman, B.E. and J.D. McIntyre. 1995. Occurrence of Bull Trout in Naturally Fragmented Habitat Patches of Varied Size. Transactions of the American Fisheries Society. 124(3): 285-296.

Rieman, B.E. and J.D. McIntyre. 1996. Spatial and Temporal Variability in Bull Trout Redd Counts. North American Journal of Fisheries Management. 16: 132-141.

Rieman, B.E. and D.L. Myers. 1997. Use of Redd Counts to Detect Trends in Bull Trout *(Salvelinus confluentus)* Populations. Conservation Biology. 11(4): 1015-1018.

Rieman, B.E., D.C. Lee, et al. 1997. Distribution, Status, and Likely Future Trends of Bull Trout within the Columbia River and Klamath River Basins. North American Journal of Fisheries Management. 17(4): 1111-1125.

Rode, M. 1990. Bull Trout, *Salvelinus confluentus* Suckley, in the McCloud River: Status and Recovery Recommendations. Redding, California, Region 1, California Department of Fish and Game.

Rohrer, R.L. 1991. River and Stream Investigations: Upper Boise River Basin Fisheries Investigations, Idaho Dept. of Fish and Game.

Saffel, P.D. and D.L. Scarnecchia. 1995. Habitat Use by Juvenile Bull Trout in Belt-Series Geology Watersheds of Northern Idaho. Northwest Science. 69(4): 304-317.

Schill, D.J. 1991. River and Stream Investigations: Statewide Data Summary, Statewide Population Simulations/Bull Trout Aging and Enumeration/Hagerman Bait-Hooking Study/Electrophoresis Sampling Guidelines, Idaho Dept. of Fish and Game.

Sexauer, H.M. 1994. Life History of Bull Trout, *Salvelinus confluentus,* in the Eastern Cascades, Washington. Central Washington University, Ellensburg, Washington. 85 p.

Sexauer, H.M. and P.W. James. 1993. A Survey of the Habitat Use by Juvenile and Prespawning Adult Bull Trout, *Salvelinus confluentus,* in Four Streams in the Wenatchee National Forest. Central Washington University, Ellensburg, Washington.

Shepard, B.B. 1985. Habitat Variables Related to Bull Trout Spawning Site Selection and Thermal Preference Exhibited in a Thermal Gradient. Proceedings of the Flathead River Basin Bull Trout Biology and Population Dynamics Modeling Information Exchange, Whale Creek Community Centre, Montana; Fisheries Branch, B.C. Ministry of Environment, Cranbrook, British Columbia.

Shepard, B. and P. Graham. 1982. Monitoring Spawning Bed Material Used by Bull Trout on the Glacier View District Flathead National Forest. 85 p, Montana Department of Fish, Wildlife and Parks, Kalispell, Montana.

Shepard, B.B., K.L. Pratt, et al. 1984. Life History of the Westslope Cutthroat and Bull Trout in the Upper Flathead River Basin, Montana. Environmental Protection Agency. Region VIII, Water Division, Denver, Colorado. 85 p.

Shepard, B.B., S.A. Leathe, et al. 1984. Monitoring Levels of Fine Sediment within Tributaries to Flathead Lake, and Impacts of Fine Sediment on Bull Trout Recruitment. Proceedings of the Wild Trout III Symposium, Mammoth Hot Springs, Yellowstone National Park, Wyoming.

Statler, D.P. 1988. Dworshak Reservoir Investigations: Trout, Bass and Forage Species. Nez Perce Dept. of Fisheries Resource Management, Orofino, Idaho. Orofmo Project Office.

Sullivan, K. 1985. Long Term Patterns of Water Quality in a Managed Watershed in Oregon: 1. Suspended Sediment. Water Resource. Bull 21(6): 977-987.

Swanberg, T. 1996. The Movement and Habitat Use of Fluvial Bull Trout in the Upper Clark Fork River Drainage. Missoula, Montana, University of Montana. 61 p.

Swanberg, T. 1997. Movements of Bull Trout (*Salvelinus confluentus*) in the Clark Fork River System after Transport Upstream of Milltown Dam. Northwest Science. 71(4): 313317.

Swanberg, T. 1997. Movements of and Habitat Use by Fluvial Bull Trout in the Blackfoot River, Montana. Transactions of the American Fisheries Society. 126: 735746.

Thiesfeld, S.L., A.M. Stuart, et al. 1996. Migration Patterns of Adult Bull Trout in the Metolius River and Lake Billy Chinook, Oregon. Portland, Oregon, Oregon Department of Fish and Wildlife.

Thomas, G. 1992. Status Report: Bull Trout in Montana. Helena, MT 59620. Montana Department of Fish, Wildlife and Parks.

Thompson, R.B. and D.F. Tufts. 1967. Predation by the Dolly Varden and Northern Squawfish on Hatchery-Reared Sockeye Salmon in Lake Wenatchee. Transactions of the American Fisheries Society. 96(4): 424-427.

Thurow, R.F. 1997. Habitat Utilization and Diel Behavior of Juvenile Bull Trout, *Salvelinus confluentus,* at the Onset of Winter. Ecology of Freshwater Fish 6:1-7.

Thurow, R.F. and D.J. Schill. 1996. Comparison of Day and Night Snorkeling, Night Snorkeling, and Electrofishing to Estimate Bull Trout Abundance and Size Structure in a Second-Order Idaho Stream. North American Journal of Fisheries Management. (l6): 314-323.

Underwood, K.D., S.W. Martin, et al. 1992. Investigations of Bull Trout *(Salvelinus confluentus),* Steelhead Trout *(Oncorhynchus mykiss),* and Spring Chinook Salmon *(0.tshawytscha)* Interactions in Southeast Washington Streams. Portland, Oregon, Bonneville Power Administration.

USDA Forest Service. 1992. Sweetwater Creek Bull Trout Passage Project. McKenzie Ranger District, Willamette National Forest, Oregon. 5 p.

USDA Forest Service. 1995. Olallie Creek Bull Trout Passage Project. McKenzie Ranger District, Willamette National Forest. 6 p.

USFWS. 1994. Endangered and Threatened Wildlife and Plants; 12-Month Petition Finding on the Bull Trout. Department of the Interior, U.S. Fish & Wildlife Service.

USFWS. 1995. Endangered and Threatened Wildlife and Plants; 12-Month Recycled Petition Finding for a Petition To List the Bull Trout as Threatened or Endangered. Department of the Interior, U.S. Fish & Wildlife Service, Washington, D.C.

USFWS. 1997. Endangered and Threatened Wildlife and Plants; Proposal to List the Klamath River Population Segment of Bull Trout as an Endangered Species and Columbia River Population Segment of Bull Trout as a Threatened Species. Department of the Interior, U.S. Fish & Wildlife Service, Washington D.C.

USFWS. 1998. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Klamath River and Columbia River Distinct Population Segments of Bull Trout. Federal Register. June 10 63(11): 31647-31674. U.S. Fish and Wildlife Service.

Watson, G. and T. W. Hillman. 1997. Factors Affecting the Distribution and Abundance of Bull Trout: An Investigation at Hierarchical Scales. North American Journal of Fisheries Management. 17(2): 237-252.

WDFW. 1998. Washington State Salmonid Stock Inventory: Appendix Bull Trout/Dolly Varden. Washington Department of Fish and Wildlife.

WDW. 1993. Draft: Bull Trout/Dolly Varden Management and Recovery Plan. Washington Department of Wildlife, Management Division, 600 Capital Way, North Olympia, WA 98501-1091.

Williams, K.R. and J.W. Mullan. 1992. Implications of Age, Growth, Distribution**,** and Other Vitae for Rainbow/Steelhead, Cutthroat, Brook, and Bull Trout in the Methow River, Washington. Appendix K.: Production and Habitats of Salmonids in Mid-Columbia River Tributary Streams. Monograph I: J.W. Mullan, K.R. Williams, G. Rhodus, T.W. Hillman and J.D. McIntyre, U.S. Fish and Wildlife Service: 389-465.

Wissmar, R.C. and S.D. Craig. 1997. Bull Trout Spawning Activity, Gold Creek, Washington. Seattle, Washington. 15 p, Fisheries Research Institute, University of Washington.

Ziller, J.S. 1992. Distribution and Relative Abundance of Bull Trout in the Sprague River Subbasin, Oregon. Proceedings of the Gearhart Mountain Bull Trout Workshop, Corvallis, Oregon. Chapter of the American Fisheries Society.

Chinook Salmon

Status and federal register information-
http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Chinook/Index.cfm

Chum Salmon

Status and federal register information-
http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Chum/Index.cfm

Coho Salmon

Status and federal register information-
http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Coho/Index.cfm

Sockeye Salmon

Status and federal register information-
http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Sockeye/Index.cfm

Steelhead

Status and federal register information-
http://www.nwr.noaa.gov/ESA-Salmon-Listings/Salmon-Populations/Steelhead/Index.cfm

Coastal Cutthroat Trout

July 5, 2002 67 FR 44934 44961
Withdrawal of Proposed Rule to List the Southwestern Washington/Columbia River Distinct Population Segment of the Coastal Cutthroat Trout as Threatened; More Abundant than Believed, or Diminished Threats.

Westslope Cutthroat Trout

June 10, 1998 63 FR 31691

Insects— Butterflies

Dornfeld, E.J. 1980. Butterflies of Oregon. Timber Press. (*Photos are black and white, distributions and taxonomy are somewhat dated. Written descriptions are easy to use and ecological information is good.*)

Hinchliff, J. 1995, 1996. An Atlas of Washington Butterflies. Range maps by township for distribution of Oregon butterflies. Oregon State University Press.

Howe, W.H., (ed.) 1975. The Butterflies of North America. Doubleday and Company. (*Good identification guide, limited range and habitat information. Plates are representative and well done. Out of print.*)

Pyle, R.M. 1981. Audubon Society Field Guide to North American Butterflies. Chanticleer Press. (*Organized by shape and color, rather than taxonomy. Photos do not represent full range of variation.*)

Scott, J.A. 1986. The Butterflies of North America: A Natural History and Field Guide. Stanford University Press. (*Good identification, range, and habits. Taxonomy and names do not always agree with other authorities*).

Mammals

Ingles, L.G. 1965. Mammals of the Pacific States, California, Oregon, Washington. Stanford University Press, Stanford, Calif.

Johnson, R.E. and K.M. Cassidy. 1997. Terrestrial Mammals of Washington State: Location Data and Predicted Distributions. Volume 3 in Washington State Gap Analysis Final Report (K.M. Cassidy, C.E. Grue, M.R. Smith, and K.M. Dvornich, editors.). Washington Cooperative Fish and Wildlife Research Unit, University of Washington, Seattle. 304 pp.

Maser, C. 1998. Mammals of the Pacific Northwest from the Coast to the High Cascades. Oregon State Press, Corvallis Oregon.

Maser, C., B.R. Mate, J.F. Franklin, and C.T. Dryrness. 1981. Natural History of Oregon Coast Mammals. USDA For. Serv. Gen. Tech. Rep. PNW-133, 496 p. Pac. Northwest For. And Range Exp. Stn., Portland, Oreg.

Powell, R.A. and W. J. Zielinski. 1994. Fisher. *In* Ruggiero, L.F., Aubry, K.B., Buskirk, S.W., Lyno, L.J., and W.J. Zielinski, tech. editors. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. Pages 38-66.

WDW. 1993. Status of the Western Grey Squirrel (*Sciurus griseus*) in Washington. Unpublished report. Washington Department of Wildlife, Olympia.

Carnivores

Brittell, J.D., R.J. Poelker, S.J. Sweeney, and G.M. Koehler. 1989. Native Cats of Washington. Washington Department of Wildlife. Olympia WA. 169pp.

Interagency Grizzly Bear Committee. 1987. Grizzly Bear Compendium. Interagency Grizzly Bear Committee, Denver, Colorado. 540pp.

McLellan, B.N. and D.M. Shackleton. 1988. Grizzly Bears and Resource-Extraction Industries: Effects of Roads on Behavior, Habitat Use and Demography. J. of Applied Ecology (1988). 25:451-460.

Ruggiero, L.F.; Aubry, K.B., Buskirk, S.W, Lyno, L.J., and W.J. Zielinski, tech. editors. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the Western United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 p.

Servheen, C. 1997. Grizzly Bear Recovery Plan Supplement: North Cascades Ecosystem Recovery Plan Chapter. U.S. Fish and Wildlife Service, Missoula Montana. 24 pp.

Bats

Barbor, R.W. and W.H. Davis. 1969. Bats of America. University Press of Kentucky. Lexington Kentucky. 286pp.

Christy, R.E. and S.D. West. 1993. Biology of Bats in Douglas-Fir Forests. Gen. Tech. Rep. PNG-GTR-308. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 28 p. (Huff, Mark H.; Holthausen, R.M.; Aubry, K.B., Tech. coords. Biology and management of old-growth forests).

Nagorsen, D.W. and M. Brigham. 1993. Bats of British Columbia. Vancouver : UBC Press, 164pp.

Marine Mammals

Angell, T., and K.C. Balcomb. 1984. Marine Birds and Mammals of Puget Sound. University of Washington Press. Seattle WA.

Evans–Hamilton, Inc and D.R. Systems, Inc. 1987. Puget Sound Environmental Atlas. Prepared for U.S. Environmental Protection Agency, Puget Sound Water Quality Authority and the U.S. Army Corps of Engineers.

Loughin, T.R., Perlov, A.S. and V.A. Vladimirov. 1992. Range-Wide Survey and Estimation of Total Number of Steller Sea Lions in 1989. Marine Mammal Science 8(3):220-239.

Molluscs—Columbia Pepplesnail

Frest, T.J. and E.J. Johannes. 1991. Present and Potential Candidate Molluscs Occurring within the Range of the Northern Spotted Owl. Final Report. Deixis Consultants, Seattle WA.

Neitzel, D.A. and T.J. Frest. 1989. Survey of Columbia River Basin Streams for Giant Columbia River Spire Snail *Fluminicola columbiana* and Great Columbia River Limpet *Fisherola nuttalli*. Pacific Northwest Laboratory, Richland Washington. 34pp.

Taylor, D.W. 1982. Status Report on the Great Columbia River Spire Snail in Southern Idaho. Tomales Bay Marine Laboratory. 7pp.

Plants

Creso, I. 1984. Vascular Plants of Western Washington. Irene Cresso Publisher, Tacoma, WA. 532p.

Gamon, J.G. 1995. Report on the Status of *Castilleja levisecta* (Greenman). Washington Natural Heritage Program, Department of Natural Resources, Olympia.

Hitchcock, C.L. and A. Cronquist. 1973. Flora of the Pacific Northwest. University of Washington Press, Seattle.

Sheehan, M. and N. Sprague. 1984. Report on the Status of *Castilleja levisecta* Greenman. Washington Natural Heritage Program, Department of Natural Resources, Olympia.

Shelly, J.S. and J. Gamon. 1996. Water Howellia (*Howellia aquatilis*) Recovery Plan: Public Agency and Review Draft. Prepared for U.S. Fish & Wildlife Service, Helena, Montana.

Hitchcock, C.L., A. Cronquist, M. Ownbey, and J.W. Thompson. 1961. Vascular Plants of the Pacific Northwest. Seattle, University of Washington Press. 1955–1969.

Jolley, R. 1988. Wildflowers of the Columbia Gorge. Oregon Historical Society Press. 331pp.

Washington Natural Heritage Program. 1981. An Illustrated Guide to the endangered, threatened and sensitive vascular plants of Washington. WNHP. 1981.

22.0 Glossary and Abbreviations

22.0 Glossary and Abbreviations

Definitions are provided below for regulatory, administrative, and technical terms used in biological assessments and the ESA Section 7 consultation process, followed by a list of abbreviations used in this manual.

22.1 Glossary

A-weighting — A frequency-weighting method in which the sound levels are adjusted to approximate the frequency range of human hearing (commonly shown as dBA for A-weighted decibels).

action (50 CFR 402.02) — Any activity or program of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas. Examples include but are not limited to actions directly or indirectly causing modifications to the land, water, or air; actions intended to conserve listed species or their habitat; and the promulgation of regulations.

action agency — The federal agency proposing to undertake a major construction project (action).

action area — All areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action (50 CFR 402.02).

affect/effect — To *affect* (a verb) is to bring about a change (example: The proposed action is likely to adversely affect piping plovers nesting on the shoreline). The *effect* (usually a noun) is the result (example: The proposed highway is likely to have the following effects on the Florida scrub jay). *Affect* appears throughout Endangered Species Act Section 7 regulations and documents in the phrases *may affect* and *likely to adversely affect*. *Effect* appears throughout Section 7 regulations and documents in the phrases *adverse effects*, *beneficial effects*, *effects of the action*, and *no effect*.

air gun — A device used in underwater seismic surveys that uses air under pressure to produce loud sound levels.

ambient sound level — The background sound level, which is a composite of sound from all sources near and far.

attenuation — See *transmission loss*.

audiogram — A graphical representation of the frequency range and minimum decibel level capable of being heard by different species in units of sound pressure.

baseline — The starting point for analysis; ambient conditions from which to measure and compare potentially altered conditions caused by project activities.

batched biological assessment — A biological assessment that provides collective coverage for groups of similar types of projects or for projects that take place in a similar geographic location.

batched biological evaluation — The term used by U.S. Army Corps of Engineers for informal biological assessment.

beneficial effects — Contemporaneous positive effects without any adverse effects on the species or habitat. By definition, beneficial effects cannot be considered to have *no effect*.

best management practices (BMPs) — Methods, facilities, built elements, and techniques implemented or installed during project construction to reduce short- and long-term project impacts on listed and sensitive species and habitat. These measures are included as part of the federal agency's proposed action.

biofiltration — The process of filtering water through biological materials, such as vegetation.

bioinfiltration — The process of infiltrating water through biological materials, such as vegetation.

biological assessment —The information prepared by or under the direction of an action agency to determine whether a proposed action (major construction activity) is likely to affect listed and proposed species and designated and proposed critical habitat that may be present in the project action area, including the evaluation of potential effects of the action on such species and habitat. The outcome of the biological assessment (BA) determines whether formal consultation or a conference is necessary.

biological opinion — The document prepared by the U.S. Fish and Wildlife Service or NOAA Fisheries that states the opinion of the Service as to whether a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat.

bioretention — The process of temporarily retaining water in a natural terrestrial community of plants, microbes, and soil.

candidate species — A species for which the Service has on file sufficient information on biological vulnerability and threats to support a proposal to list it as threatened or endangered. Until a proposed rule is issued to list a candidate species,authors of biological assessments are not required to address the species, although it is recommended.

coalescing plates — A device with parallel plates to separate oil from water by means of gravity.

community noise level — See *environmental noise level*.

compost — Organic residue, or a mixture of organic residues and soil, that has undergone biological decomposition until it has become relatively stable humus.

conference — A process of early interagency cooperation involving discussions between an action agency and the Services pursuant to Section 7(a)(4) of the Endangered Species Act regarding the likely impact of the agency's proposed action on proposed species or critical habitat. Conferences are intended to help identify and resolve potential conflicts between an action and species conservation early in project planning, and to develop recommendations to minimize or avoid adverse effects (50 CFR 402.02, 50 CFR 402.10).

conservation measure (CM) — Activities or measures that help recover listed species.

critical habitat — Specific geographical areas that possess physical or biological features that are essential to the conservation of listed species. These designated areas may require special management consideration or protection.

cumulative effects — The effects of other, future state or private actions that are reasonably certain to occur within the federal project action area (50 CFR 402.02). (This definition of cumulative effects is different from the one provided under NEPA.)

cylindrical spreading —The spreading (of sound) in a cylindrical or tubular form from the source.

decibel (dB) — A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure. The reference pressure for water is 1 micro pascal (µPa) and air is 20 micro pascals (the threshold of healthy human audibility).

delayed mortality — When a fish dies more than 1 hour and less than 48 hours after removal from the fish cage.

delayed mortality zone — The radius around a pile being driven where the peak sound pressure level and impulse are not great enough to result in immediate death, but result in mortality several hours to several days later.

destruction or adverse modification (50 CFR 402.02) — A direct or indirect alteration that appreciably diminishes the value of critical habitat for both survival and recovery of listed species, including an alteration to physical or biological features that were the basis for determining the habitat to be critical.

detention — The temporary storage of runoff, which is released at a slower rate than it was collected. Detention facilities are most commonly used for flow control.

direct effects — Impacts resulting from the proposed action.

discountable effects — Potential effects of a proposed action that are extremely unlikely to occur. Based on best judgment, a person would not expect discountable effects to occur.

distinct population segment (DPS) — A designation used by the U.S. Fish and Wildlife Service for a discrete vertebrate stock that is treated as an individual species (e.g., a specified seasonal fish run in a particular river). This is equivalent to the NOAA Fisheries evolutionarily significant unit (ESU) classification.

drywell — A well completed above the water table so that its bottom and sides are typically dry except when receiving fluids. Drywells are designed to disperse water below the land surface and are commonly used for stormwater management in eastern Washington.

ecology embankment — A stormwater treatment facility constructed in the pervious shoulder area of a highway, consisting of a vegetation-covered French drain containing filter media.

effect/affect — See *affect/effect*.

effects of the action —The direct and indirect effects of a federal action on listed species or critical habitat, together with the effects of other interrelated and interdependent activities. Direct effects are those resulting from the proposed action. Indirect effects are those caused by the proposed action later in time, but still reasonably certain to occur. Interrelated actions are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration.

endangered species — A species that is in danger of extinction throughout all or a significant portion of its range.

environmental noise level — The normal or existing level of environmental sound at a given location, in the absence of traffic.

evolutionarily significant unit (ESU) — A designation used by NOAA Fisheries for certain local salmon populations or runs that are treated as individual species. This is equivalent to the U.S. Fish and Wildlife Service distinct population segment (DPS) classification.

federal action agency — The federal agency that proposes a specific action or triggers a federal nexus for a project (by providing permits, funding, etc.). This agency is responsible for formally submitting a biological assessment for the proposed action to the Services for review and informal or formal consultation.

federal nexus — A project with a federal nexus either has federal funding, requires federal permits, or takes place on federal lands.

filter strip — A grassy area with gentle slopes that treats stormwater runoff from adjacent paved areas before it can concentrate into a discrete channel.

formal consultation — The process between the Services and the action agency that commences with the action agency's written request for consultation under Section 7(a)(2) of the Endangered Species Act (ESA) and concludes with the Service's issuance of a biological opinion under Section 7(b)(3) of the ESA.

frequency — The number of times per second that the sine wave of sound repeats itself, or that the sine wave of a vibrating object repeats itself. Now expressed in hertz (Hz), formerly in cycles per second (cps).

frequency spectrum — Distribution of sound pressure versus frequency for a waveform, dimension in root mean square (RMS) pressure and defined frequency bandwidth.

gas bladder — An air-filled sac located between the alimentary canal and the kidneys. It is filled with CO_2, O_2 and N_2 in different proportions than found in air, also called the swimbladder. It is functionally a hydrostatic organ to help control buoyancy, but also plays an important role in sound reception in some species of fish.

hair cells — Cells within the inner ear of most vertebrates that contain cilliary bundles that respond to sound pressure and create the sensation of hearing.

harass (50 CFR Part 17) — An intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying to such an extent as to significantly disrupt normal behavior patterns, which include but are not limited to breeding, feeding, and sheltering.

hard site conditions — Areas where there is no excess ground-effect noise attenuation, such as asphalt, concrete, hard-packed soils, and water surfaces.

harm (50 CFR Part 17) —In the definition of *take* in the Endangered Species Act, an act that actually kills or injures wildlife, including habitat modification or degradation that significantly impairs essential behavioral patterns such as breeding, feeding, or sheltering.

hertz (Hz) — Frequency or cycles per second; the number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sounds are below 20 Hz, and ultrasonic sounds are above 20,000 Hz.

hydrophone — An underwater microphone.

impervious surface — A hard surface area that either prevents or retards the entry of water into the soil and from which water runs off at an increased rate of flow.

impulse — The time integral of the peak pressure, typically described in units of pounds per square inch per millisecond (psi/msec). It recognizes that a short pulse may do less damage than a longer duration pulse of the same pressure. Sound pressure is equivalent to kilowatts, while impulse is equivalent to kilowatt-hours.

incidental take — A *take* of listed species that results from an action but is not the direct purpose or intent of the action, as defined under the Endangered Species Act. Incidental *take* can be authorized through Section 7 consultation or through Section 10 conservation planning, such as a habitat conservation plan (HCP).

indirect effects — Effects caused by the proposed action later in time but still reasonably certain to occur.

infiltration — The downward movement of water from the surface to the subsoil.

infiltration pond — A facility that contains excess runoff then percolates that runoff into the surrounding soil.

informal consultation — There may be two types: 1) an optional process that includes all discussions and correspondence between the Service and the action agency or designated nonfederal representative prior to formal consultation (if determined to be necessary), or 2) the process initiated either to notify the Services of a no-effect determination, or to secure concurrence from the Services for a project that may affect but is not likely to adversely affect listed species or critical habitat.

insignificant effects — Effects that should never reach the scale where *take* occurs. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects.

interdependent action — An action having no independent utility apart from the proposed action.

interrelated action — An action that is part of a larger action and depends on the larger action for its justification.

is likely to jeopardize the continued existence of a proposed species or adversely modify proposed critical habitat —When the action agency or the Services identify conditions where the proposed action has this result, a conference is required.

is not likely to adversely affect — The appropriate finding in a biological assessment (or conclusion during informal consultation) when effects on listed species are expected to be discountable, insignificant, or completely beneficial.

jeopardize the continued existence of — To engage in an action that reasonably would be expected to directly or indirectly reduce the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

jeopardy (50 CFR 402.02) — Classification given to an action that reasonably would be expected to directly or indirectly reduce the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

kilojoule (kJ) — The basic unit of force moving a body a unit distance in the metric system is 1 newton-meter or 1 joule. One joule is 0.7376 foot-pounds. A thousand joules (or one kilojoule) is represented as kJ.

lagena — One of three symmetrically paired structures in the inner ear of fishes associated with the bony otolith. In most species the lagena detects acoustic pressure and acoustical particle motion.

line source of noise — A source of noise spread out into a line, such as the combined traffic on a roadway.

listed species — Any species of wildlife, fish, or plant that has been listed as endangered or threatened under Section 4 of the Endangered Species Act. Listed species are found in 50 CFR 17.11–17.12. Under the statute, the two types of species are treated in virtually the same way.

major construction activity — A construction project (or other undertaking having similar physical effects) that is a major federal action significantly affecting the quality of the human environment, as referred to in the National Environmental Policy Act (NEPA, 42 USC 4332 (2)(c).

may affect, likely to adversely affect — The appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect on listed species may directly or indirectly result from the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial. If the overall effect of the proposed action is beneficial to the listed species but is also likely to cause some adverse effects, then the proposed action is *likely to adversely affect* the listed species. If incidental *take* is anticipated to result from the proposed action, a determination of *likely to adversely affect* should be made, requiring initiation of formal Section 7 consultation.

may affect, not likely to adversely affect — The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial.

mean lower low water — Zero tidal elevation. Minus tides are below MLLW.

media filter — A filter that includes one of multiple media for removing pollutants such as compost, gypsum, perlite, zeolite, or activated carbon.

micro pascal (μPa) — Most underwater acoustic sound pressure measurements are stated in terms of a pressure relative to one micro pascal.

millisecond (msec) — One thousandth of a second.

minimization measure — Measures that reduce the impact of the project on listed species.

mortality (fish) — Cessation of all activity including movements of the operculum, or when all respiration stops and the fish lies motionless.

National Pollutant Discharge Elimination System (NPDES) — The provision in the federal Clean Water Act that requires point source dischargers of pollutants to obtain permits, called NPDES permits. In Washington state, NPDES permits are administered by the Department of Ecology.

no effect — The appropriate conclusion when the proposed action will not affect a listed species or its critical habitat (i.e., will have no effect whatsoever—neither beneficial effects, nor highly improbable effects, nor insignificant effects).

occupied critical habitat — Critical habitat that contains individuals of the species at the time of the project analysis. A species does not have to occupy critical habitat throughout the year for the habitat to be considered occupied (e.g., migratory birds). Subsequent events affecting the species may result in this habitat becoming unoccupied.

outfall — The point of water discharge from a stormwater facility.

overpressure — A positive pressure above ambient levels.

pascal (Pa) — A unit of pressure equal to one newton per square meter.

peak (sound) — The absolute peak sound level measured during an event.

peak sound pressure (unweighted), dB re 1 µPa — The peak sound pressure level based on the largest absolute value of the instantaneous sound pressure over the frequency range from 20 Hz to 20,000 Hz. This pressure is expressed here as a decibel (referenced to a pressure of 1 µPa) but can also be expressed in units of pressure, such as µPa or PSI.

performance-based biological assessment — A type of biological assessment usually written early in the design phase of a project. Because detailed information on the project description and design is lacking at that stage, they establish habitat and species safeguards by defining actions that will not be included in the project or impacts that will be avoided.

performance measure — An observable or measurable benchmark for a particular performance objective against which a project can be compared. If the standards are met, the related performance objectives are considered to have been fully achieved. It is something quantifiable. Standards should be measures, not actions and should be: 1. Achievable, and 2. Capable of being monitored.

physoclistus fish species — See *physostomus*.

physostomus fish species — A species in which the swim bladder is connected to the esophagus by a thin tube. Air to fill the swim bladder is swallowed by the fish and directed to the swim

bladder. Air removal from the swim bladder is by expulsion through this tube to the esophagus. Physoclistus fishes have no such connection. Instead, they add gas to the swim bladder using a highly specialized gas secreting system called the rete mirabile, which lies in the wall of the swim bladder and extracts gas from the blood using a counter-current system, much like that found in the kidney to remove wastes from the blood. Removal of gas from the swim bladder occurs by reabsorption into the blood.

pile-driving time — The number of minutes to drive a second section pile to its predetermined elevation.

piscivorous animal — A fish-eating animal.

point source noise — A noise whose source is more or less concentrated at a single point, such as construction noise or a single vehicle heard from a distance.

predation — The act of preying on another animal.

programmatic biological assessment — A biological assessment that establishes conditions allowing specific activities that occur within general programs to proceed without individual concurrence from the Service (or allowing a shortened concurrence timeline).

programmatic biological evaluation — Term used by U.S. Army Corps of Engineers for an informal programmatic biological assessment.

propagation loss — The decrease in sound pressure level due to the spherical spreading of the sound wave. In the farfield, the rate of decrease in the sound pressure level is proportional to the distance, or 1/r. In an unbounded, homogeneous medium, propagation loss is on the order of 6 dB for every doubling of the distance.

proposed species —Any species of wildlife, fish, or plant that is proposed in the Federal Register to be listed under Section 4 of the ESA as threatened or endangered.

range (of a species) — The area or region over which an organism occurs.

rate — Percentage probability of an effect.

reasonable and prudent measures — Actions that the Services believe are necessary and appropriate to minimize the impacts (amount or extent) of incidental *take*. These measures are communicated to an action agency in a biological opinion issued by the Service.

receiving water — A body of water or a surface water system to which surface runoff is discharged.

receptor (noise) — The object or perceiver that receives or responds to a sound.

recovery — Action that is necessary to reduce or resolve the threats that caused a species to be listed as threatened or endangered.

retention — The permanent collection and holding of stormwater runoff. Retention facilities are most commonly used for pollutant removal.

rise time — The time interval a signal takes to rise from 10 percent to 90 percent of its highest peak.

RMS impulse (root mean square) — Root square of the energy divided by the duration. It is the mean square pressure level of the pulse of sound from a strike of the hammer on a pile. It is described as the average pulse pressure and accepted as the reaction threshold for whales to seismic signals. RMS impulse is expressed in dB re 1 micro pascal. It is the unweighted root mean square sound level (20 Hz to 20 kHz) in dB re 1 µ Pa averaged over the duration of an impulse of sound.

root mean square (RMS) – The average of the squared pressures over the time that comprise that portion of the waveform containing 90 percent of the sound energy for one pile-driving impulse, commonly used in repetitive or relatively continuous measurements such as in speech or highway noise. It is not applicable to transient signals such as explosions. It is used in calculating longer-duration sound pulses such as a pile-driving pulse of sound.

sacculus — One of three symmetrically paired structures in the inner ear of fishes associated with the bony otolith. In most species the sacculus detects acoustic pressure and acoustical particle motion. This is where the hair cells are located.

sand filter — A manmade depression or basin with a layer of sand that treats (removes pollutants from) stormwater as it percolates through the sand and is discharged via a central collector pipe.

the Services — Abbreviated term for the U.S. Fish and Wildlife Service and NOAA Fisheries.

soft site conditions — Areas such as normal earth or ground with vegetation that are absorptive to sound energy, thereby providing ground-effect attenuation.

sound exposure level (SEL) — A common unit of sound energy used in airborne acoustics to describe short-duration events. The time integral of frequency-weighted squared instantaneous sound pressures. It is proportionally equivalent to the time integral of the pressure squared and can be described in terms of µ Pa2 sec over the duration of the impulse. (Source: Fisheries and Hydroacoustic Monitoring Program Compliance Report, San Francisco-Oakland Bay Bridge East Span Seismic Safety Project 6-11.)

sound flanking — Noise that reaches an observer by paths around or over an acoustical barrier such as a bubble curtain.

sound intensity — The rate at which sound energy flows through a unit area.

sound pressure level (SPL) — Sound pressure is the sound force per unit area, usually expressed in micro pascals (or 20 micro newtons per square meter), where 1 pascal is the pressure resulting from a force of 1 newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressure exerted by the sound to a reference sound pressure (e.g., 20 micro pascals). SPL = 20 log { } ∂ *P* µ 1 1. Sound pressure level is the quantity that is directly measured by a sound level meter.

source (noise) — A general term designating the prime sound energy generator.

species — Includes any subspecies of fish, wildlife, or plant, or any distinct population segment of any species of vertebrate fish or wildlife, which interbreeds when mature.

species of concern — A species, usually thought to be in decline, that may be considered for federal candidate status in the future.

spherical spreading — Spreading of sound pressure in a dome or sphere shape from the source.

suitable habitat — The area where an organism, including a plant, animal or fish, naturally or normally lives and grows.

swale — A natural depression or shallow drainage conveyance with relatively gentle side slopes, generally less than one foot, used to temporarily store, route, or filter runoff.

swimbladder — See *gas bladder*.

take (taking) — To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct (as defined under the Endangered Species Act). USFWS has expanded this definition to also include significant alteration or disturbance of habitat.

threatened species — Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

threshold discharge area — An on-site area draining to a single natural discharge location or multiple natural discharge locations that combine within ¼ mile downstream (as determined by the shortest flow path).

time expended — A field operation term indicating the time to bring up a cage, unload the fish, put a new group in, and drop the cage back to depth.

total acoustic energy (dB re 1 µPa2 sec) — Proportionally equivalent to the time integral of the pressure squared, described here in terms of µPa2 sec over the duration of the impulse. Similar to the unweighted sound exposure level (SEL) standardized in airborne acoustics to study noise from single events.

transducer — A device used to convert underwater sound into electrical voltage.

transect — A marked or measured line or strip at a project site along which environmental samples are collected.

transmission loss — The accumulated decrease in acoustic intensity as the acoustic pressure wave propagates outward from the source due to spreading.

trench — A long cut in the ground, i.e., a ditch or swale.

trend line — In technical analysis, a line or two parallel lines that indicate the direction in which a measurable effect is moving, and the direction in which it will continue to move.

underpressure — Negative pressure spike below ambient levels.

unoccupied critical habitat — Critical habitat that is not occupied (i.e., not permanently or seasonally occupied) by the listed species at the time of the project analysis. The habitat may be suitable, but the species has been extirpated from this portion of its range. Conversely, critical habitat may have been designated in areas unsuitable for the species, but restorable to suitability with proper management, if the area is necessary to either stabilize the population or assure eventual recovery of a listed species. As recovery proceeds, this formerly unoccupied habitat may become occupied. Some designated, unoccupied habitat may never be occupied by the species, but was designated since it is essential for conserving the species because it maintains factors constituting the species' habitat. For example, critical habitat may be designated for an upstream area maintaining the hydrology of the species' habitat downstream.

utriculus — One of three paired structures in the inner ear of fishes associated with the bony otolith. In most species the utriculus is involved in sound detection.

vault — An underground storage facility that collects runoff and either percolates that runoff into the surrounding soil at various rates or permanently pools the runoff.

waveforms (μPa over time) — A graphical plot illustrating the time history of positive and negative sound pressure of individual pile strikes shown as a plot of μPa over time (i.e., seconds).

wavelength — The distance between successive peaks or nodes of a wave.

wet pond — A facility that contains a permanent pool of water and removes pollutants from highway runoff through sedimentation, biological uptake, and plant filtration.

wet vault — An underground storage facility that permanently pools water and acts as a settling basin for fine sediment bound with pollutants.

22.2 Abbreviations

ABC	air bubble curtain
AKART	all known, available, and reasonable methods of prevention, control, and treatment
BA	biological assessment
BE	biological evaluation
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	best management practice
BO	biological opinion
CCA	chromated copper arsenate
CE	categorical exclusion
CFR	Code of Federal Regulations
CM	conservation measure
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
dBA	A-weighted decibel
dbh	diameter at breast height (of a tree)
DPS	distinct population segment
EA	environmental assessment
ECA	equivalent clear-cut area
Ecology	Washington Department of Ecology
ECS	environmental classification summary
EFH	essential fish habitat
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESU	evolutionarily significant unit
FEMAT	Forest Ecosystem Management Assessment Team Report (same as NFP)
FHWA	Federal Highway Administration

FMP	fishery management plan
FONSI	finding of no significant impact
FR	Federal Register
GMA	Washington Growth Management Act
HCP	habitat conservation plan
HLP	Highways and Local Programs, WSDOT
HOV	high-occupancy vehicle
HPA	hydraulic project approval
HRM	WSDOT *Highway Runoff Manual*
HRM/ESA checklist	*Highway Runoff Manual*/Endangered Species Act checklist
HUC	hydrologic unit code
Hz	hertz
IL	(WSDOT) Instructional Letter
ITS	intelligent transportation systems
kJ	kilojoule
LTAA	likely to adversely affect
LSOG	late-stage old growth
LWD	large woody debris
µPa	micro pascal
MLLW	mean lower low water
MM	minimization measure
MP	milepost
msec	millisecond
NE	no effect
NEPA	National Environmental Policy Act
NFP	Northwest Forest Plan (same as FEMAT)
NIS	new impervious surface
NLTAA	not likely to adversely affect
NMFS	National Marine Fisheries Service (now NOAA Fisheries)
NOAA Fisheries	National Oceanic and Atmospheric Administration, National Marine Fisheries Service (same as NMFS)
NPDES	National Pollutant Discharge Elimination System

OHWM	ordinary high water mark
Pa	pascal
PBA	programmatic biological assessment
PBE	programmatic biological evaluation
PCE	primary constituent element
PFMC	Pacific Fishery Management Council
PHS	priority habitats and species
PM	performance measure
psi	pounds per square inch
RM	river mile
RMS	root mean square
ROD	record of decision
RPA	reasonable and prudent alternative
RPM	reasonable and prudent measure
SEPA	Washington State Environmental Policy Act
SEL	sound exposure level
SPL	sound pressure level
SSP	stormwater site plan
T&E	threatened and endangered species (may also imply any status down to and including species of concern)
TESC	temporary erosion and sedimentation control
TL	transmission loss (sound)
TMDL	total maximum daily load
TSS	total suspended solids
UIC	underground injection control
USC	United States Code
U.S. COE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WCC	Washington Conservation Commission
WDFW	Washington Department of Fish and Wildlife
WDNR	Washington Department of Natural Resources

WRIA	water resource inventory area
WSDOT	Washington State Department of Transportation